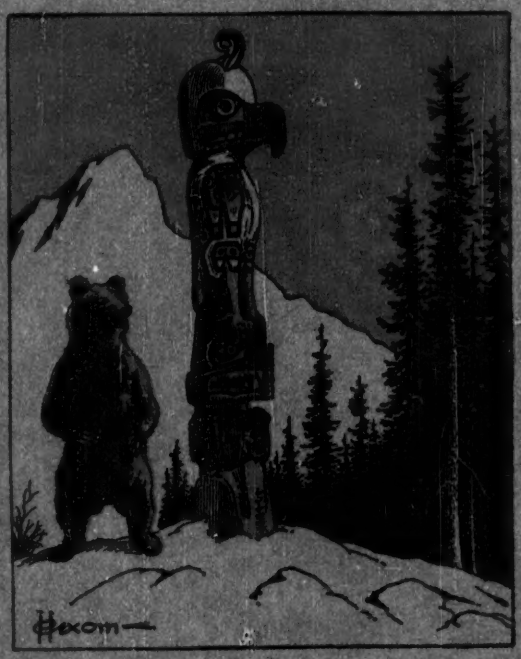
Nature Magazine

VOLUME 46 NUMBER 2



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At $6.50 (including five full meals), the *Olbia's* voyage is a fair example of dream trips you can afford. And there are others — colorful journeys to exotic lands that often cost little more than your vacation at home. Trade your usual beach for a houseboat in the Vale of Kashmir, or a cruise among the lesser Caribbean islands by native trading schooner.

You can travel clear around the world — to South Seas coral isles and the misty lakes of New Zealand, to Australia and the plains of Africa, to Europe's leisurely antiquity — for just $478 in fares. That long steamer jaunt can be duplicated in ten days by plane for $1,700, but where's the fun?

Last year, 52 million Americans spent a record of $12 billion on vacations. Many went on organized cruises at prices from $125 to $25,000. But some traveled off the tourist track, got cheaper and more glamorous vacations.

JUST REMEMBER

●● *Bargain paradises get that way because they haven't been discovered by tourist mobs. They're harder to find and to reach — but more rewarding.*

●● *Chromed ocean liners and international hotels are America transplanted. For fun at budget prices, go by freighter and stay at pensions.*

●● *Make your longest hop from Europe, not directly from the U.S. Currency differentials and lower European rates can save up to 50%.*

●● *Don't go unless you're ready to plan well ahead and to shop for travel bargains.*

CARIBBEAN. There are still undiscovered Edens at America's back door. Tobago, the Robinson Crusoe island that rivals Tahiti, where living is so cheap the island's chief official gets only $240 a month. Or Grenada, which, as a native described it: "Dis islan', suh, is t'ing Gahd mek from rainbo'." There, for $12 a week, you can rent a three-bedroom house with its own private beach. Many of the best spots can be reached only by trading schooner: Go down to the waterfront at Grenada or elsewhere and bargain with dusky skippers to make your own price — keep this up and cruise all the lesser islands of this jeweled chain.

Here is a sampling of dream trips

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India. Minimum fare from New York to Ceylon, India, or Malaya is about $350. Transhipping in England, you can make the trip by luxury liner (tourist class) for $319. Go to the lotus-covered mountain lakes of Kashmir, where a furnished houseboat with four turbanned servants rents for $70 a month. Total costs for a couple run around $175 a month — in the most beautiful spot on earth.

South Seas. You can still live the life of a Tahitian beachcomber — but not in Tahiti, which has found out about the Yankee dollar. Instead, drowse on brilliant Sigatoka Beach at Suva or watch Pacific combers crash on reef-girt Norfolk or Lord Howe Islands. (You can reach the South Seas by freighter from the U.S.)

Africa. Perhaps the biggest travel bargain today is an 80-day luxury cruise around the Dark Continent, calling at a score of colorful ports like Dar-es-Salaam, for $700, round trip from Amsterdam. (You can reach Holland for $165 from the U.S.)

Mediterranean. A two-week cruise to Malta, Naples, Casablanca, and Lisbon starts as low as $92, round trip from London. But try a longer stay — in the lush valleys of Mount Olympus on Cyprus, where a couple can live comfortably for $1,400 a year; on Aegean islands that hide remnants of a 5,000-year-old civilization among olive and cork groves; or with the fisherfolk of rocky Sardinia, where hotel rates are 24c a day or $1.12 with three good meals.

Atlantic Islands. Green cones standing out of the sparkling waters of the South Atlantic — these are the Azores and the Canaries. Tropical flowers, sandy beaches, and the charm of old Spain are combined here — with rents of about $20 a month, groceries for a couple at $10 a week and servants $5 a month each.

The vagabond voyager with a fistful of dreams can get aids to planning from these 2 guides:

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Nature in Print

By HOWARD ZAHNISER

RICHARD MORENUS, a radio script writer in New York, advised by his physician in 1940 that he was "through with radio and the tempo of metropolitan living," purchased a 10-acre island in Abram Lake, to the northeast of Lake of the Woods, a few miles from the railroad at Sioux Lookout in Ontario, in "the bush" that extends on to Hudson Bay, and lived there six years in a cabin his predecessor had built in a disappointed expectation that he could attract and accommodate American tourists. A considerable distance directly north of the Quetico Provincial Park in the Quetico-Superior wilderness canoe country, which conservationists are striving to preserve, Mr. Morenus learned to live a year-round wilderness life and to understand not only the few other white men who inhabited this region but to a certain extent the Ojibway Indians also. When he began to wonder if he "really had much more to learn from the bush, or whether the years to come would unfold merely variations of the things . . . already experienced," he returned to the United States where he now is commercial manager for KIHO in Sioux Falls, South Dakota.

Now, another six years later, he has published his account of his bush years with the title conferred on himself by the Ojibway Indians, *Crazy-White-Man* (*Sha-ga-na-she Wa-du-kee*). Curiously enough, he had to return to our busy civilization to write his book. "I knew without question," he tells us, "that sometime I wanted to do some serious writing about the north, and I was just as certain that, as long as I stayed in the bush, I should never find time to do it."

It is an interesting, circumstantial, realistic account that Mr. Morenus has provided, not only of his own life but including also significant tales of other men's (and women's) adventures in "the bush." And it carries a freshness and a sense of immediacy with it.

When a friend commented that life in the beautiful, unspoiled wilderness must have been wonderful, now that he had "become used to it," Mr. Morenus was moved to make one of his most spirited comments: "Yes, it is beautiful," he wrote, "but you do not become 'used' to living in the bush."

"I didn't get used to the cold, the storms, the blizzards, or the rains," he went on. "I didn't get used to the unending struggle against the elements. I didn't get used to hard physical work. I endured them all, but I didn't get used to any of them. And notwithstanding all these and more things which I never got used to, I still love the bush. I love its grandeur, its majesty, its dignity; its virginal primitiveness, its insidious and fabulous charm; the greatness of it; its challenge. I knew its strength and had felt the immensity of its power. I respected it. And I was no longer afraid of it. The bush had taught me many things. But," he insisted, "I never got used to it."

Perhaps for that very reason, Mr. Morenus has been able to write with directness and simplicity and a freshness that make his book seem vivid and real, a faithful representation of mid-Twentieth Century life in the Canadian wilds of Ontario.

Still farther to the north, at Churchill, on the western shore of Hudson Bay, is the scene of Theodora C. Stanwell-Fletcher's new book, *The Tundra World*.

Six years ago Mrs. Stanwell-Fletcher's account of her British Columbia wilderness living with her husband, *Driftwood Valley*, brought her the John Burroughs Medal. *The Tundra World*, although written later, tells of its author's earlier experiences, about 1934, when, as a college student of natural history, she spent a summer in this northern land and (if one surmises rightly) formed the attachments that took her later to the scene of *Driftwood Valley*.

The Tundra World is a delightful, charming book of much gusto — sometimes almost ecstatic enthusiasm — and yet it is a book with a poignantly keen awareness of life. Possibly for a freedom from the restraining realities that would embarrass a writer of straight fact, our author has cast this volume of recollections in the form of fiction, the journal of her fictitious heroine. Thus doubtless she has spoken truth the more effectually, and one doubts also that she has allowed herself to miss much of the factual. Occasionally she has even to escape from her fiction into the very matter-of-factness of footnotes: "Mr. and Mrs. A. A. Anderson," for example, "two of Churchill's best known citizens, who have lived in the North for many years and now own one of Churchill's largest stores, have a little Eskimo girl acquired in much this same manner." Oh, this is truly a charming volume, literature to be savored more than once. The people with which it is alive are good to meet, and the wild world with which it is concerned is a world in which it is good indeed to spend a summer, although only vicariously.

"Here," writes Mrs. Stanwell-Fletcher, "you have a world composed of, and controlled by, living, animate, spiritual things and great creative forces — animals and plants, seas and ice, winds and storms, weathers and seasons. Except for the train, the grain elevator, a few trucks that bump occasionally along the quarter mile of gravel which passes for a road in Churchill, life here has little to do with a soulless, mindless, machine-controlled existence." It is a wilderness where "again and again," with "the great scientists and explorers," our author knows the "comforting, continuous" thought of "definite purpose and beneficence in the great, creative underlying force of all things."

The ecstasy that Mrs. Stanwell-Fletcher realizes from her associations with the wildness of this region — realizes and communicates — is pervasive, but perhaps it can be exemplified in a few sentences she writes of the "perfectly thrilling sight" of many caribou, including these:

"When they all walked in the shallow sea it made a great, swishing, splashing sound. A pair of rough-legged hawks, whose nest was on the low bare rock ledge, circled above us. Out on the cove, five arctic loons gave haunting, desperately lonely cries; and back on land, carried faintly by the breeze, were myriad songs and calls of curlew and plover and sandpiper and other shore birds. All the music of the tundra and wild and lonely places."

But Mrs. Stanwell-Fletcher's observations and reflections at and around this far outpost do not give her a reassurance for our civilization — although she seems to feel, as do many of us, that our civilization might well be so corrected — in fact, *may* well be so corrected — as to come into harmony with our universe of life.

"More and more," she writes, "you become impressed,

The Other One

By COSETTE MIDDLETON

I often wonder at the one who looks
Into my face from ponds and pools and brooks.
Last spring she wore a lacy green chapeau
With willow-plumes across the shoulder — so!
In summer I have watched her trying on
A halo hat of sky and cloud chiffon —
A blue and white creation stitched in gold,
Tied with a bit of rainbow she unrolled.
In autumn she wears daring, feathered things
With thistle pom poms, crimson sumac wings,
Bronze taffetas with fluffs of thistledown
And smoky asters tucked along the crown.
(I paused before a window once — she stood
Serene and warm in ermine scarf and hood).
Last night I saw her in a well, and there
Were sequins sprinkled in her dusky hair.

especially when you contact true wilderness areas, with the *stupidity* of man—his ignorance and lack of understanding and ridiculous inability to get on with other forms of life which were put here in this world just as surely as he was, and form such an essential part in the whole scheme of things."

She realizes that "there doesn't seem to be anything particularly out of order in man's using animals for food and clothing, especially in a wild land where he is dependent on them for his existence. All forms of life live on other forms."

"The crime," she perceives, "lies in the fact that man has so needlessly exterminated whole races of animals, when he might have used carefully a limited supply; the wholly unnecessary and terrible suffering he causes, when he might just as easily (and for his own profit) have exercised careful handling and respect for their welfare; his utter lack of appreciation so often not only for their usefulness but for the very great beauty and pleasure and inspiration contributed by so many of them."

Sam Campbell in his recently published book of wilderness wisdom entitled *Nature's Messages* seems to have such thoughts at the center of his philosophy, too. "Naturalness in its deepest sense is the criterion of worth in this world," Mr. Campbell concludes in his essay on "Naturalness." And in "Rain," one of the earlier in this collection of three dozen short essays, he observes: "There seems to be only one wisdom and that is to interfere as little as possible with the natural order of things." Mr. Campbell is "sure that beauty, power, balance, evenness are truly fundamental in nature" and "equally sure that brotherly love, service, and Christianly principles are basic with man." And he is convinced that if man would not "vainly attempt to change nature to fit our ideas" but would allow the universal laws that are "natural to the world and to him to operate without interference, he would more quickly become conscious of the perfect state of being for which he yearns."

From his forest home in his 500-acre wildlife sanctuary within the Nicolet National Forest in northern Wisconsin Mr. Campbell has made many excursions into the wilderness and into the outside world to lecture and tell of what he has learned. His book, *Nature's Messages*, gathers into short compass his reflections on many aspects of the natural world and presents them in a volume where fifty-six of its 221 pages are devoted to photographs and their legends, which often are photo-verses in thought and typography, as on page 95 where, below a photograph of waves surging ashore, there are these lines:

> There is a source of wonderment
> greater than stellar magnitudes,
> the tricks of time,
> or the miracle of growth.
> It is that we are here
> and have within us the ability
> to know beauty, to be kind,
> to experience patience, peace,
> and deep piety.

Sam Campbell has lived for many years where he could know the wilderness. As from Richard Morenus we can learn how the wilderness seems to a modern American who lives for half a dozen years a frontier bush life, as from Mrs. Stanwell-Fletcher we can learn the ecstasies and poignancies of an intensive excursion into a wild land, so from Sam Campbell we can gather the understandings that come with a lifetime in which access to wildness is frequent and extensive through the years.

Perhaps we shall return to these books again and ponder their meaning as we think of ourselves in our urban civilization with our needs for the wilderness, but for now we shall have to be content with thus presenting them as three books with tonic from the north.

Crazy-White-Man (*Sha-ga-na-she Wa-du-kee*). By Richard Morenus. Chicago: Rand McNally & Company. 1952. 320 pp. (5½ by 8½ in.), with sketch map by the author and 20 chapter-head drawings by William Lackey. $3.75.

Nature's Messages: A Book of Wilderness Wisdom. By Sam Campbell. Chicago: Rand, McNally & Company. 1952. 221 pp. (5¼ by 8¼), with 56 photographs on 56 pages.

The Tundra World. By Theodora C. Stanwell-Fletcher. Boston: Little, Brown and Company. 1952. 266 pp. (5½ by 8¼ in.), with frontispiece in color from a painting by George Miksch Sutton and list of references. $3.50.

Products

"Angler's Valet" is the name given to a lightweight, waterproof tackle belt produced by Riverside Manufacturing Co., Woodstock, Virginia. It is made of Firestone Velon and is fitted with an array of plastic vials and shatterproof containers that will provide the fisherman places to put about all he needs while angling. It is priced at $5.95. . .J-Dapter Co., 1020 Home Avenue, Akron, Ohio, have developed a new pouring spout for milk bottles, guaranteeing a steady, even stream. It comes in various colors, is easy to clean and costs twenty-five cents.

McKay to Speak

Secretary of the Interior Douglas McKay will be a featured speaker on the program of the opening general session of the Eighteenth North American Wildlife Conference, which meets in Washington, D.C., March 9 to 11. Since the new Secretary has charge of so many Federal interests that are the concern of this annual gathering, his view will be eagerly awaited. This Conference is the largest and most important annual international conservation meeting in North America. Sessions will be held at the Hotel Statler.

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Shoemaker Retires

After thirty-seven years in the wildlife conservation movement, Carl D. Shoemaker has retired as conservation director of the National Wildlife Federation. Coming into the field in 1915 as head of the Oregon Fish and Game Commission, Carl came to Washington in 1928 to represent the States of Oregon and Washington in matters pertaining to wildlife legislation. In 1930, when the special Senate Committee on Conservation of Wildlife Resources was established, he became special investigator for the committee and then its secretary, which post he held until the Committee was abolished in 1948. In the course of this association, Carl was closely associated with many important pieces of wildlife legislation.

Carl is a member of the Federal Water Pollution Control Advisory Board, and some thirty societies and organizations in the conservation field. He was awarded the Wildlife Society's Aldo Leopold Memorial Award and Medal in 1951. He will continue as editor of the Conservation News Service for the Natural Resources Council of America and as advisor to the Federation. He will be succeeded as conservation director by Charles H. Callison, whom he selected two years ago as his assistant.

Besides being a conservationist of long standing, Carl is also an accomplished amateur magician and a worker in wood. He was tendered a reception and dinner at the Statler Hotel in Washington on January 9 by his many friends.

Opossums

Possums. By Carl G. Hartman. Austin, Texas. 1952. University of Texas Press. 174 pages. Illustrated. $6.00.

In *Nature Magazine* for August, 1930, Dr. Carl G. Hartman wrote an article on the opposum based upon extensive studies of this North American marsupial. He had, only a short time before, witnessed the birth of a 'possum baby and its migration to the mother's pouch. By his studies before that time and since, Dr. Hartman has become widely known as the world's leading authority on the opossum. His studies led him into the folklore of this mammal, and to its first introduction to a European, who happened to be the captain of the *Nina* of Columbus' tiny fleet. Dr. Hartman has also studied the marsupial-rich fauna of Australia in order to compare our own marsupial with those from down under. All this material provides introductory chapters to this fascinating book, the balance of which is devoted to our North American 'possum. We cannot imagine that there is anything about his subject that the author has overlooked, and he has written about it in delightful and informative fashion.

Heads N.J. Audubon

Remsen Brinckerhoff of Englewood, New Jersey, has been elected president of the New Jersey Audubon Society, succeeding Mrs. Herbert E. Carnes, who has been president since 1949. Frank Frazier of Montclair and Roger Barton of Caldwell were chosen vice-presidents; Mrs Chester Burt of Park Ridge as secretary: Charles Thomas of Bergenfield as treasurer. The executive secretary of the Society is Frank W. McLaughlin, conservationist, lecturer and wildlife photographer, and headquarters of the Society is 796 River Road, New Milford, N.J.

Frog, City Planner

Neighbor Flap Foot, the City Planning Frog. By Bill Ewald and Merle Henrickson. New York. 1952. Henry Schuman. 56 pages. Illustrated. $2.50.

There are two main characters in this story. One is Flap Foot, a loquacious and well-informed frog who has definite ideas as to how a city should be planned and how a neighborhood should look. The other is Mickey, a boy who is interested in his neighborhood. Between the two of them they provide a very good idea of the fundamentals of city planning.

Spectographers

The American Association of Spectographers is planning a symposium on "Emission Spectroscopic Determination of Metals in Non-Metallic Samples," The symposium will be held in Chicago on May 1, 1953. Contributed papers in the fields of petroleum, geology, agriculture, pharmacy, biology, ceramics, etc., are welcome. Address inquiries to J. P. Pagliassotti, c/o Standard Oil Company, Box 431, Whiting, Indiana.

Membership Application Blank

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Contents Noted

As a part of a collection of material being sent out to teachers by the National Science Teachers Association, there comes to hand a booklet entitled "Machine Tools, America's Muscles." This is a publication of the National Machine Tool Builders Association, and it is an effective, concise presentation of the importance of the best in tools. However, the booklet starts out with a fallacy that we are sorry to see broadcast in this way. The text begins with the statement: "A nation's capacity to produce depends on only three factors: (1) Its natural resources; (2) Human energy available; (3) Its 'tools'. Of these, the first two are fixed; Natural resources cannot be increased. Human energy is limited." Tools, therefore, it is argued, are the only factor that can be changed. At the top of the page on which this statement appears is a drawing of a farmer plowing with an old-fashioned plow; at the bottom a tractor plow. We have no quarrel with emphasizing the importance of outstanding tools, although we might debate the fixing of a limit limit on human energy. But certainly we differ with the idea that natural resources are limited. No doubt the author of this booklet was thinking of mineral resources; non-renewable natural resources. However it is sloppy thinking to conclude that our renewable natural resources cannot be increased. By proper treatment of our soil, its productivity can be increased. Our forests, by wise management, can increasingly contribute to our capacity to produce. Our waters, freed of pollution, can provide greater wealth to our economy. Our renewable natural resources *can* be increased, and the best in machine tools can help in the process.

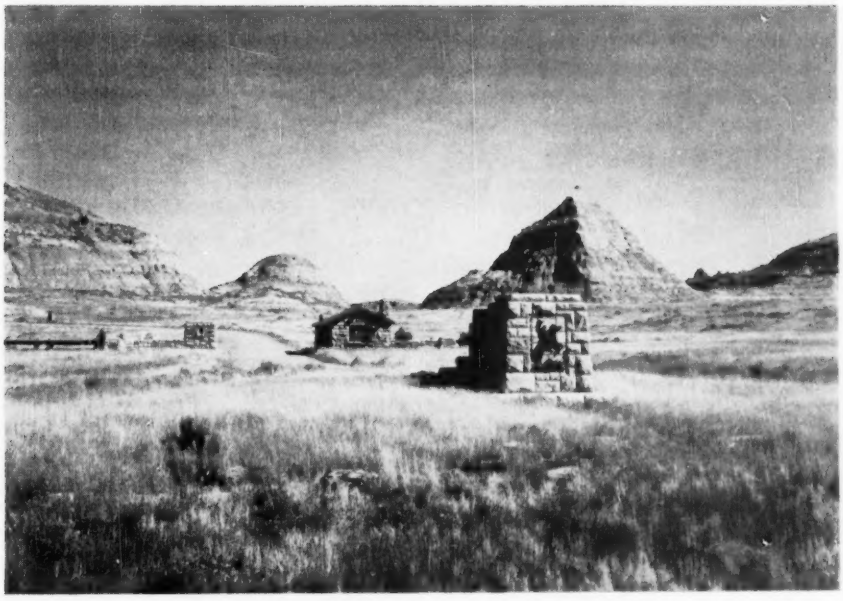
Of all of the places for a burglar to attempt to burglarize, the lion house at the zoo seems to be the most uninviting. However, a burglar did attempt this recently at the Philadelphia Zoo. In the small hours of the morning the marauder tried to jimmy a lock on the door to the new lion house. Failing to succeed, he broke a large plate glass window in a door and climbed through, leaving blood as evidence. There was nothing inside the building worth burglarizing, unless the burglar was interested in lions. Something — perhaps a lion's roar — appears to have disturbed him, since he apparently left the place in a hurry; was spotted in his flight by a watchman, but got away. The folks at the Philadelphia Zoo rather wish the man would let them know just what he had in mind; whether he was drunk, crazy, paying a bet, or trying to get experience so he could become a lion trainer.

Snake venom introduced into the human system by the bite of a poisonous snake destroys red blood cells and blood platelets. Permanent injury or death are possible. Outdoor-going people should know what to do in case of a bite. Circulation of the poison should be checked by a tourniquet and emergency treatment applied, followed by removal to a hospital for treatment as quickly as possible. Blood transfusions are often necessary in treating bite victims. In one recent case more than a gallon of blood was needed, so the availability of an adequate supply of blood for transfusion is important. Here is another reason why regular donations must be made to the National Blood Program. Your local Red Cross chapter will be glad to hear that you would like to contribute your pint. It might be you or someone near to you who is bitten by a snake.

Among the final acts of Oscar L. Chapman, before he turned over the office of Secretary of the Interior to his Republican successor, was to recommend the elimination of Echo Park and Split Mountain dam sites from the program of dam development of the upper Colorado River. Thus Mr. Chapman officially disposed of a conservation problem that involved the invasion of Dinosaur National Monument. He was faced by aroused and united conservationists on one side and vociferous local groups on the other; by the opposed view of two agencies under his jurisdiction, the National Park Service and the Bureau of Reclamation. In recommending the elimination of these disputed sites, Mr. Chapman urged the study of alternative proposals that had been brought forward by conservationists. This stand by the retiring secretary does not, of course, estop the local interests, through their legislators, from proposing legislation in favor of these sites. However, it is believed that the official ruling and the attitude of the incoming administration indicate that united conservation groups have scored another victory for park and monument protection.

On this page in the December issue we commented on the status of the trumpeter swan to the effect that its protection in our West seems to have saved it from "the edge of oblivion." Some of our Canadian friends feel that we were ignoring the Canadian trumpeter swans, and the splendid program of protection of the birds that has preserved a population of between 700 and 900 birds in western Canada. Of course, in earlier and more complete discussion of this bird, we have dealt fully with Canada's well-guarded flocks, and our comment in December was merely a matter of record so far as the trumpeter in the United States is concerned. Canada, indeed, is still trying to find the breeding grounds and migration routes of a percentage of its swans, the meanwhile assigning a special guardian for those whose breeding grounds is northwestern Alberta are known. British Columbia boasts other flocks, and its still great wilderness continues to hold some secrets about them.—R.W.W.

A view of the lands found in the south portion of Theodore Roosevelt National Memorial Park near Medora, North Dakota



The east entrance to Roosevelt Park off U.S. Highway 10, showing the entrance sign to the Park.

The Park that Made A President

By VICTOR H. CAHALANE

National Park Service photographs.

"I WOULD not have been President," said Theodore Roosevelt, "had it not been for my experiences in North Dakota."

In 1883, Theodore Roosevelt was twenty-five years old and serving his third term in the New York Assembly. During September, he left his "politicking" to hunt big game in Dakota Territory. Both his wife and mother died the following February, and he threw his energies and fortune into cattle ranching. In this raw frontier country, he learned the practical workings of democracy. The "Four Eyes" tenderfoot, and "Easter Punkin Lilly," as he was dubbed at first, soon earned the respect and admiration of the cowboys and gunmen. What was even more important to the future of the United States, he learned the desperate need for conservation of wildlife, soil and forests.

Three years before Roosevelt's arrival, the Northern Pacific Railroad had penetrated the Little Missouri Badlands of Dakota Territory. It brought civilization to the region and destruction to the wildlife. Vast herds of buffalo, numbering more than 300,000, were wiped out. Mountain sheep, elk, antelope, grizzly bears and deer became rare.

"There warn't but one mountain sheep left," reminisced a cowpuncher later on. "and Teddy, he shot that." (Actually, one sheep was recorded as being shot in 1906, and another in 1915.)

When drought, followed by the severe winter of 1886-87 nearly wiped out the cattle barons' herds, the last of the big game species were also nearly exterminated. Their numbers had become too low to withstand this natural disaster. Roosevelt returned to his New York political activities, which eventually became Nation-wide. As President of the United States, he established the policies of conservation that are in effect today. Breaking away from the old system of exploiting natural resources, Roosevelt revived and enlarged the Forest Service, and paved the way for the organization of the National Park Service and the Soil Conservation Service.

Much of what the Badlands did for Theodore Roosevelt can be done for any visitor today. They may not make him President of the United States, but certain other hardships are also eliminated. It is no longer necessary to lassoo a cow and milk her upside down to get a cup of milk. Attempts to make rain scientifically, at nearby Medora, may eventually alleviate the drought periods. Hunting with a gun has been replaced by hunting with a camera.

The vast horizons; the weird beauty of fantastically carved rock formations; the now slothful, now raging Little Missouri River remain. By degrees, the herds of big game, long since vanished, are being restored.

Unlike many wilderness parks, this Theodore Roose-

At the left is a view northwest over Cedar Canyon from the overlook on U.S. Highway 10. This scene is typical of the North Dakota Badlands preserved in this Park. Below is a section of petrified tree, one of many such specimens. This one is on a divide between Jones Creek and Jule Creek.

velt National Memorial Park is not "embellished" by hotels, restaurants, and souvenir counters; not even a tourist cabin! Because of the hard-surfaced U. S. Highways Nos. 10 and 2, motels, hotels, restaurants, garages and grocery stores are within easy driving reach in towns and villages outside the park.

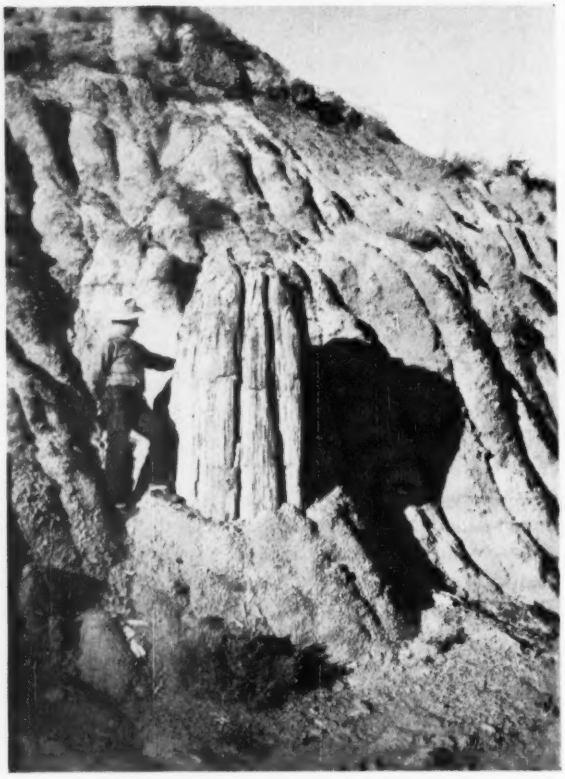
The visitor who wants to sleep under the stars and broil his campfire steaks with the ghosts of General Custer and Sitting Bull, can spread his blanket roll under a tree, or near a wild-rose thicket. If he prefers piped water and rest rooms, he may pitch his tent in Squaw Creek or Cottonwood Campgrounds. Eating and sleeping in the park is the most satisfactory way fully to enjoy the weird beauty of this primitive area.

For the man who cannot or should not undertake long hikes, there are easy walks that can take him into the history of sixty million years ago.

The Little Missouri River and its tributaries created the exciting Badlands of North Dakota. Together with the wind and rain, they have ploughed out of the plains a chaos of gorges, high mesas, deep valleys, domes and pinnacles. In places the main river has sliced down into the earth, cutting away sheer cliffs of four hundred feet. On these exposed walls, in the contours and bands of colors are the writings of many millions of years.

Petrified forests occur in many places throughout the Roosevelt Park. Numerous fossil stumps and trunks of giant sequoia trees are still standing. They measure up to fifteen feet high, and as much as ten feet in diameter. In at least one place the "stone" trunks stand in horizontal strata, some twenty feet above the others. These are the remains of successive forests that grew in different periods, millions of years apart.

These examples of prehistoric trees buried upright by mineral waters, sands and mud, in this way turned into "stone," and then excavated by erosion processes,



are more dramatic than in any other national park, except perhaps the Petrified Forest of Arizona. You find more color, and greater amounts of petrified wood in Arizona, but not the number of upright trunks.

If you are more interested in later history, you may prefer the teeth and skeleton of a mammoth that was found nearby a year or two ago. Mammoths, which were elephants, flourished from the middle Miocene to

When the Theodore Roosevelt National Memorial Park was dedicated in June, 1949, a pageant was held to depict some of the events in the history of the area. Here we see a reproduction of a camp of the Custer expedition.

the end of the Pleistocene. Their bones would be only one to nineteen million years old! North American camels, also, have been found among the fossils of the Badlands of South Dakota.

Many years before Washington crossed the Delaware, the jumble of extraordinary scenery found in Theodore Roosevelt Memorial Park was named by French explorers. "The Bad Lands" — *terres mauvaises* they called it.

"Hell, with the fires burned out," General Sully exclaimed, much later, when he was pursuing the Indians in the 1860's.

Actually, the fires have not gone out. For thousands of years, coal beds in this area have been burning underground. Veins of lignite coal cracked open as the earth's surface shifted, and were later exposed by erosion. Fires resulted, due to spontaneous combustion, lightning, and prairie fires. Lignite is much younger than hard coal — three hundred million years — or even the younger soft, black, bituminous coal. Formed in the Cenozoic Era, lignite is only some thirty to fifty million years old. More woody, it contains many outlines of the vegetation from which it is formed. Because it contains more water, it is less combustible. Exposed to the air, it begins to disintegrate. Outside the park, however, there is a business concern that briquettes the lignite and sells it locally for fuel.

Nature's underground furnaces have burned vast, incalculable tons of coal, they have heated nothing but the earth, and have been witnessed only by an occasional Indian, cowboy, traveler, or geologist. Land around these fires has sometimes had to be ploughed to avoid starting new prairie fires. A strong draft will cause smoke and hot gases to rise forty or fifty feet high.

You may not find an underground fire when you visit the park. But you will see hundreds of acres of evidence. These fiery furnaces have left weird rock formations tipped with red clinker beds, locally called "scoria." As many as twenty-three distinct colors can sometimes be found in a single canyon. There are black and brown bands of unburned coal, red scoria, yellow sulphur and sand, blue slate, gray ash, white chalk, and many others. These colors vary with the amount of sunlight, moisture and the season. Accented against this patchwork of color are the many greens of grasses, bushes and trees.

Theodore Roosevelt National Memorial Park consists of three areas, totalling 111.2 square miles, or 71,181 acres. All three are bisected by the Little Missouri River, which flows north. The two largest areas are about sixty miles apart. The third, very small in size, lies between these two and is the site of Roosevelt's Elkhorn Ranch.

The entire park is rich in historical interest. Indians, pioneers, gunmen, cowboys, cattle barons and magnates who came in private railroad cars to hunt game with four-horse wagons — they all have crossed this stage. One particularly colorful figure was the Marquis de

A scenic park road meanders through the badlands, east of the headquarters of the Park.

Mores. The 28-room chateau that he built in this wilderness still stands about a mile from the park. The original furnishings of lace-canopied beds, Oriental rugs, silver, fine linens, wine coolers, china, French novels (and even bear traps!) remain for the tourist to see.

A handsome French nobleman, only twenty-five years old, the marquis spent nearly a million dollars attempting to establish an empire of beef. He built the first meat-packing plant in North Dakota. Here, also, he built his chateau, a school, and a church. The town was christened with a bottle of champagne broken over the tent ropes, and named for his beautiful, red-haired American wife, Medora.

A direct descendant of the Bourbons, he was said to be planning to return to Paris, to force a *coup d'état*, and to have himself crowned king.

Be that as it may, the meat-packing venture failed. Instead of making a new fortune, he lost one, due to his youth and inexperience. (At the time he believed it was due largely to Chicago interests.) Every stockholder was repaid, and the young count dashed off on other adventures around the world. At the age of forty-eight he was killed by natives in North Africa. His eldest son, the Duke Louis de Vallambrosa de Mores, who visits the Badlands from time to time, presented the chateau and other properties to the State of North Dakota.

"Where are the animals?" asks every visitor.

There are no begging bears or pauperized deer, such as one finds in overpopulated parks. In the past, man has exterminated a number of species from the Badlands — bison, elk, bighorn sheep, antelope, black bear, grizzly, wolf, and even the little black-footed ferret; possibly others.

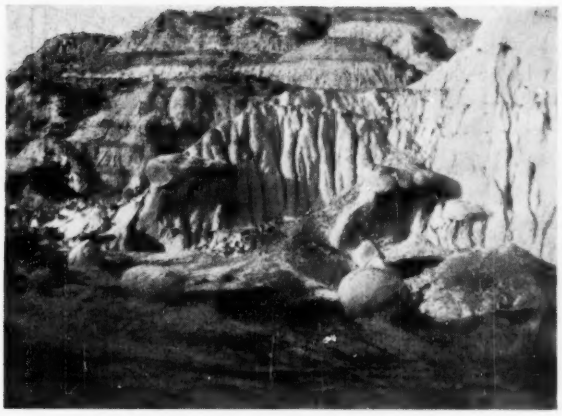
Mule deer and whitetails are the only big game that miraculously survived the great slaughter. Because the mule deer lived a great deal in the open areas that are easily hunted, they were scarce during much of the years between 1890 and 1930. They are abundant once more and are easily seen in the late afternoon and evening. Small bands and does with their fawns browse in the valleys, or come out on the open plains to nose out tender herbs among the grass crowns.

Whitetail deer, which are more secretive and live in brushy draws, were hard to hunt and thus rather unpopular with the market hunters. Whitetails are now as abundant in the park as in primitive times, although they are not as numerous as the mule deer. Both species are completely wild because they have never been exposed to the millions of tourists that crowd through long-established parks.

The open plains are the typical home of the antelope, which can run nearly sixty miles an hour. In the early days, however, great numbers of them crowded into the Badlands, at times, to escape the cold winds and winter blizzards. Due to protection by a few ranchers, a remnant of about seventy-five animals survived the great slaughter. In recent years, small bands have occasionally wandered into the Roosevelt Park from the plains where they are now increasing. Not long ago the Park Service decided to take steps to hasten this restoration.

In January, 1951, "park rangers caught seventy-five antelope in fish nets in Yellowstone Park" as the newspapers described it, and transferred them to Roosevelt Park. Actually these surplus animals were driven through temporary corrals of heavy netting, into trucks, and brought to the Park. Apparently so grateful to be on their own power again, they were at first satisfied to stay within a six-mile area. Soon most of them recovered their normal urge to roam. They dashed away, some of them thirty miles beyond the park boundaries. They startle the tourists and disturb the ranchers.

A seventy-five-mile boundary fence is being built so that a band of buffalo may be reintroduced to the area. Unlike Yellowstone Park, which is so large that it needs no fence, Theodore Roosevelt Park must have this fence to keep out domestic stock, as well as to keep in the buffaloes! Arrangements have been made for the donation of twenty-five bison from the Fort Niobrara National Wildlife Refuge in western Nebraska.



Some of the interesting and spectacular erosion detail at the base of Buck Hill.

Prairie dogs are increasing in the Park. Here is a den dug out by badgers.

Later a small number of elk will be added. The local species of bighorn sheep, which was named for Audubon, unfortunately is as extinct as the dodo. However, the best biological advice agrees that it will be feasible to fill this "vacuum" in the natural animal community by introducing the closely related race from the foothills of the Rockies.

The missing large carnivores — black bear, grizzly and wolf — cannot be restored. The park areas are too small to contain such wide-ranging predators, which would inevitably destroy domestic stock during their wanderings outside. For the same reason, the coyote, which has been nearly extirpated during the past two years by poisoning outside of the Park, cannot be kept in normal numbers.

It is unfortunate that this absence of large predators will result in a complete unbalance of hoofed mammals. Man will have to replace the predators to keep the animals to proper numbers, and to avert destruction of the range. Already the prairie-dog populations are getting out of hand.

If a small meat-eater, the black-footed ferret, could be restored, this last problem could be partially corrected, without fear of neighborhood protest. This rare and interesting member of the weasel family is needed as a biological control of the rapidly increasing "dog" colonies. The problem in this case is to find a stock of ferrets. Never numerous, the species has become extremely scarce because of the wholesale eradication in other places of its favorite food and habitat — prairie dogs and their burrows.

The most accessible and perhaps most entertaining animals in the park are the prairie dogs. There are several "dog towns," one of which is more than two miles long. Even on the hottest summer days, when the birds and most of the mammals are asleep, or drooping silently in the shadows, the prairie dogs are out. They are busy gathering food, eating it on the spot, or carrying it down to their underground rooms to lunch in the coolness. In between times they chatter back and forth on their mounded doorsteps. A hungry bobcat or badger may add considerable excitement to the busy scene. When I was there last, I saw a coyote and a badger hunting together. The badger would chase down after a fleeing "dog." His partner, the coyote, watched the exits, ready to pounce on the rodent as it fled from the badger.

Stumps and fallen logs on the banks of the Little Missouri show that the beavers are busy. Because of the periodic floods, however, beavers cannot maintain dams there. One finds the dams, houses and food piles on the small tributary creeks.

Great Plains muskrats, more brightly colored than most races, are fellow swimmers and house builders.

Yellow-haired porcupines live in the bottomlands, anywhere that woods or even small thickets can offer food and shelter.

Here and there in the crevices of ledges and cliffs are the stick nests of the bushy-tailed wood rat. It also makes its home in hollow trees and down logs in the stream bottoms. Here other woodland- and thicket-dwelling rodents are its neighbors, including the Black Hills cottontail, prairie jumping mouse and two species of white-footed mice. The two latter animals are also found on the higher sagebrush flats and grass prairies, together with the pale chipmunk, thirteen-lined ground squirrel, Audubon grasshopper mouse, bean mouse, Maximilian pocket mouse, sagebrush pocket gopher and white-tailed jack rabbit. If you are walking on the steep sides of the valleys, you may startle a Wyoming cottontail. This is a bigger, longer rabbit, with longer ears than the little Black Hills cottontail of the stream bottoms.

People who are unfamiliar with the Great Plains Region are usually astonished at the number and variety of birds. At least one hundred species are common, either as summer or permanent residents, or transients in spring and fall.

One of the most dramatic sights is the courtship dance of the sandhill cranes. Both the females and males hop, skip, bow, circle and leap madly into the air. These excited capers (Continued on page 106)

The Moose Who Liked People

By CARL C. ANDERSEN

Illustrated by Clarence Tillenius

"A huge moose stood in the doorway, cautiously poked its head in . . ."

ROYAL Danish Forest Ranger Joergensen was giving a party to celebrate the engagement of his pretty daughter, Kirsten. A big, jolly man with many friends, his roomy, thatched forester's lodge on the edge of the Gribskov woods, north of Copenhagen, was gay with lights and laughter as the guests gathered to drink the festive *schnaps* and wish the young people well. Suddenly there was a thumping at the door. Kirsten opened it. "Svea!" shouted the guests. "Svea's come to the party." A huge moose stood in the doorway, cautiously poked its head in, and then came slowly into the room. It looked solemnly around, carefully nuzzled Kirsten, gravely accepted several pieces of pastry, gave the girl a last affectionate nudge and — as haughtily as it had come — departed into the darkness. No one thought the visit unusual. Svea did things like that.

Of all the animals that the Danes have loved, few have appealed to them as much as this kindly, dignified moose. Svea's story began some years ago. I was summoned one morning by my managing editor. "Anderson," he said, "you must find us a moose, a cow moose — and quickly." Several days earlier the only cow moose in Denmark had been found dead in a North Sealand wood. She had been a national figure. Some twenty years ago she and two magnificent bull moose swam from Sweden to Denmark across the treacherous, powerful currents of the Sound — an extraordinary feat. The three animals were the first of their kind to appear in our forests in 800 years and they became objects of national pride. Danes take their animals seriously, and hundreds of letters from our readers demanded that we find a new companion for the bulls, who, as the forest rangers in North Sealand reported, were grieving over their loss.

To find a cow moose seemed impossible. Experts in Sweden, where moose abound, advised us that they refuse to be taken alive. During recent hunts there by collectors for various zoos, nineteen out of twenty of the animals, when cornered, had reputedly killed themselves by butting their heads against trees or charging over the brinks of ravines. The only one captured had refused to eat in captivity and soon died. Nevertheless we were finally successful. Torsten Kreuger, the Swedish newspaper publisher, read of our plight. Some years before, on a hunting trip, he had found a baby moose calf with a broken leg. He had nursed her back to health on his farm, and, although she was one of his favorite possessions, he was willing to give her to Denmark as a gesture of friendship.

On the day that Svea arrived at Elsinore the Danish press was there in force to meet her with reporters, photographers and newsreel men. Several thousand people had come from Copenhagen. It was apparent from the moment that Svea minced delicately down the ramp of the truck that she was no ordinary animal. "Look," gasped my photographer. "She's putting on an act." She glanced at her audience, danced gracefully on her long, slim legs into the center of the square of onlookers, and began to pose for the photographers. She looked proud, with her great head raised high in the air. She looked demure, nibbling at grass. She trotted over to a group of children and nuzzled one of them as the flashbulbs winked. And she was watching the cameramen and their activities every minute.

With Svea, as her escort, had come two solemn Swedes — Mr. Reen and Mr. Rasmussen. They had taken care of her from the time that she had been found in the woods. "You will find that Svea is an unusual animal," said Mr. Rasmussen. "She is not easy to handle." "She has peculiar ideas. She likes people," Mr. Reen added darkly.

Svea was transported to the Gribskov woods and turned loose. It was hoped that the bull moose there would find her and nature would take its course. But Svea apparently had other ideas. One evening there was thumping at the door of Ranger Joergensen's house. Kirsten went to the door, opened it, and screamed. There stood the moose, larger than a draft horse. The Ranger came running, gun in hand. Svea regarded them with her large, melancholy eyes and hung her head. The Ranger approached carefully. Moose can be extrmely dangerous; rearing up, they can kill a man with one fearful chopping blow of their forehooves. But Svea just stood. "What kind of animal *is* this?" growled Joergensen. "Maybe it wants to be petted," said his daughter. And that was exactly what Svea wanted. She was lonely.

Timidly, Kirsten scratched the top of the huge head. And just as carefully, Svea nudged the girl for more. It was the beginning of a friendship. Every morning Svea would come to the house at the edge of the forest and wait for the girl to come out. Like a dog, the tremendous animal would dash up to her and skid to a stop, follow her around, nibble her shoulder gently, and talk. Above all else, Svea liked conversation. She listened, her big eyes concentrated on the speaker. And she would reply with a deep grumbling in her throat that, besides pleasure and distress, could express many other sentiments.

The town council of Helsinge, in the middle of the Gribskov Forest, was in session one morning. Mayor Johannes Larsen, a master shoemaker of great dignity, was in the chair, when a breathless constable rushed in. "Mayor, mayor," he shouted. "There is a moose in the streets. What shall I do?" Mayor Larsen looked stern. "Is this a joke?" he demanded. It was no joke. Svea had discovered Helsinge and liked it. Wandering inquisitively down the street early that morning she found some children playing. Svea liked children. They screamed and ran away at first, but gradually came back to take another look at the great beast that seemed so friendly. Now, for the benefit of the kind of appreciative audience she loved, Svea was prancing, pirouetting, and shadow-boxing up and down the main street.

Since it was a heavily traveled route, she had traffic piled up in both directions. In a body, the council went to the scene. Mayor Larsen waved his arms and shouted at Svea — without effect. Ranger Joergensen tried to push her off the road. But a mulish look came over her face; she braced her legs and would not move. Sweating policemen tried to help the Ranger. Svea did not budge. The council held a consultation. A boy was dispatched on a bicycle to fetch Kirsten Joergenson. The Ranger's daughter arrived, looked the situation over, spoke sharply to Svea. The stubborn look disappeared, her braced legs relaxed. She swept the Helsinge council with a contemptuous glare and slowly, with head high, she trotted off toward the woods.

But Svea was not discouraged. She liked Helsinge and on her next visit she discovered Mr. Rosendahl and his pastry shop. The stout and jovial baker has never quite recovered from that first meeting. Early one morning he was arranging fresh bread and pastries on the shelves. A slight noise attracted his attention and he looked up at his show window — and into the eyes of Svea. Like a child, she had pressed her huge muzzle against the glass and was observing Mr. Rosendahl's every move with intense interest. For a while the baker tried to disregard the eerie vision. Finally he could stand it no longer. He gathered his courage and flung open the door. "Go away," he shouted. "Go away." Svea hung her head and rolled her eyes. Mr. Rosendahl, confused, retreated into the safety of his store.

Svea followed, poked her head through the doorway,

"... slowly, with head high, she trotted off toward the woods."

A cow and two bull moose swam across the powerful currents of the Sound — an extraordinary feat.

sniffed at the appetizing odors, and looked appealingly at the baker. He gave her some fresh bread, and that was Mr. Rosendahl's undoing. Every morning after that, Svea was there on the dot as the bread came out of the ovens. And she knew the difference between fresh and old bread. Nothing but the freshly baked would do. Svea liked pastry occasionally, too. But since Mr. Rosendahl considered this too expensive for a handout, she devised a way of getting it for herself. She would cavort in front of the store until the usual crowd of children had gathered. She would then pick a victim and shove him or her gently inside. Svea always got her pastry.

Next to Mr. Rosendahl's, Svea's favorite haunt was the Old People's Home with its pleasant lawn and garden. She caused panic on her first visit when she leaped the hedge, inspected the grounds minutely, sniffed at people and flowers, and finally lay down in the sun on the front porch. The old people were terrified. They could not step over the big animal to get in or out. The police were called, and again were powerless. It took Kirsten Joergensen to move her. Svea had decided that she liked old people as she liked children. She would arrive with a leap over the hedge, browse briefly in the garden, and then hold court among her new friends.

Svea's most dangerous predilection was automobiles. They fascinated her. She liked to stop them, investigate the occupants, have a chat. A friend of mine had one of these unnerving experiences. He was on his way back to Copenhagen after a week-end in North Sealand. Coming around a bend in the road through the Gribskov Forest he suddenly saw a huge animal broadside ahead of him. A large deer, he thought, and blew his horn. A deer would have been gone in a flash. Not Svea. The motorist jammed on his brakes and skidded to a stop, barely in time.

Svea, still as a statue, looked down from her great height at the small open car. Slowly she ambled around to the driver's side. Having amiably prodded the shoulder of the terrified man with her muzzle, she sniffed at the back of the automobile, inspected it and then with a last friendly poke sauntered away.

Every month or so, Svea was on the agenda of the Helsinge council. The police complained that she required the service of one constable almost full time for traffic control and the investigation of her various misdemeanors. Mayor Larsen, who had never quite overcome the loss of dignity that he had suffered at Svea's hands, considered her an evil influence and maintained that she was giving the community a bad name. There were fierce debates over her removal but, somehow, at the end of every session Svea's banishment was always deferred.

And then one day Svea was ill. She had dragged herself up to Ranger Joergensen's lodge and lain down, panting. Her eyes were dull. The Ranger responded at once and so did Helsinge, and the whole of Denmark. The animal ambulance of the big State Veterinary Hospital at Landbohoejskolen picked her up. At the hospital three of our best veterinarians labored to save her from a lung infection. Letters and telephone calls poured into the offices of the Copenhagen newspapers, where managing editors had ordered daily reports on Svea's condition placed on the front pages.

One of our prominent citizens insisted that chewing tobacco would be the best cure; another suggested large quantities of the powerful Danish *schnaps*. But it was aureomycin from the United States that preserved her life. A group of worried Copenhagen businessmen cabled an associate who happened to be on a trip to America to buy the medicine according to a prescription worked out by the Danish doctors. The aureomycin went back to Denmark by air, and a few weeks later Svea was back on her feet as healthy and obstreperous as ever.

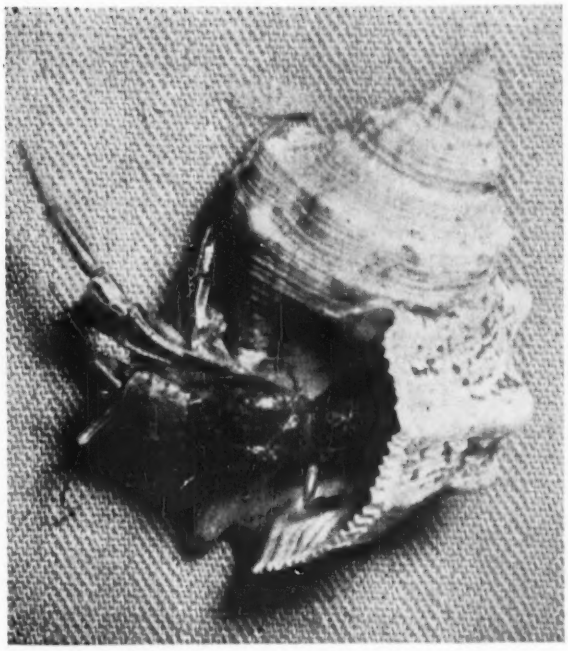
(Continued on page 103)

Squatter's Rights

By MARION WHITNEY

THE curving strand line formed white scallops on the margin of the shore and stretched into the gray distance along Galveston Island. Countless millions of tiny, bleached pelecypod shells clustered close together here in this milky way of the seashore, but where were the gastropods? I had searched all afternoon for them. Not a single gastropod shell had I found, not even a fragment! I had begun to be puzzled as well as disappointed. Where were they?

"The tide's in. Let's go swimming!" called my friend. Reluctantly I gave up my search and went in the water with her. We waded quite far out along the gently sloping beach until the water was about chest deep and the breakers were keeping us busy jumping to meet their rhythmic progress toward the shore. Once, on the down beat, my foot struck something sharp and rough, then again and again. What was on this normally smooth floor? The waves nearly prevented my finding out, but at last I got one of these objects between my toes and brought it to the surface. It was a gastropod shell, at last. There was something in it; not seaweed, because it moved! The shell was inhabited, but not by its builder and rightful owner, who was on the list of the departed. Here was a squatter who had come to inhabit this noble mansion built by *Polinices*, a snail-like dweller of the seashore. This tenant was a shy, unfriendly fellow, who had all but vanished into the inner recesses of the shell — all, that is, but his numerous tell-tale legs. The recluse was the shy hermit crab, which had appropriated this home for temporary use. For as long as he clung to it, it was his to be moved when he moved, to hide him securely from enemies, to be tossed by wave and swept by undertow until there would come a day when his expansive growth would force upon him the necessity of appropriating a larger home. He would find moving none too strenuous, but would simply crawl out of the old home and back his way into a new one, while some other squatter would quickly snatch his abandoned castle. At the end of the curved, soft abdomen of the crab were two claws with which to grasp and cling to his new shell. Since his abdomen is soft, it molds to fit the shape of the shell he inhabits.



This green, slick-bodied hermit crab emerged far out of the *Purpura* shell, but would not loose its hold even when it became excessively hot under the flood lights. The squatter clung to the shell, shed three legs explosively and tried to crawl away from the photographic lights.

Safe at home in a thick *Polinices* shell, the tenant hermit crab, exercising squatter's rights, can hide from harm.

As the tide began to recede I found hermit crabs in all sizes and forms of gastropod shells, from tiny fragments of high-spired gastropods, scarcely a quarter of an inch long, up to *Busycon* shells six or seven inches long.

One *Oliva* shell contained two different kinds of squatters. A hermit crab clung to the inner portion of the shell, while a *Crepidula*, the slipper gastropod, lived on the outside of this beautiful, glossy shell. Which one claimed priority was hard to tell, but they

A female hermit crab evicted from her home shows the hundreds of tiny, dark red eggs that she carries attached to her abdomen, and, at the very end of her curved abdomen, the small grasping claws by which she clings to her appropriated home.

seemed to be living harmoniously together, and the *Crepidula*, no doubt, found some advantage in being taxied hither and thither upon the beach.

When undisturbed the hermit crab will extrude its body far out of the shell and creep or even run along the shore. Its stalked eyes are ever on the alert for motion of a possible enemy. When disturbed, he swiftly retreats into his shell leaving only a small portion of his straw-like legs visible; or, if his shell is big enough, he can hide completely. When the hermit's body is drawn deep within the shell, the big claws fill up the door to the shell and thus cover his head from harm. There, safe within his new home, the crab hides until all enemies have departed. When all is calm, out come a couple of pair of slender legs and the stalked eyes. The environs are surveyed. If all is well, the cautious fellow continues to promenade the beach with his home upon his back.

I gathered a number of specimens and took them home to photograph. Since some of them were green-bodied and inhabited beautifully colored shells, I decided to photograph them in color upon a pink cushion. In order to make colored pictures at a speed fast enough to stop any possible motion, I had to place the lamps fairly close to the crabs. One shy individual had been reluctant to emerge from his habitation until the flood lights over-heated the shell. Then he stretched nearly all of his length across the lip of the shell. Just as I was about to take the picture there was a startling snap, and off shot a leg, then another and another — just like popcorn. The poor creature was shedding the legs that had gotten too hot under the flood lights. Close to its body on each leg is a breaking point where injured limbs can be severed. At this point the blood vessels are constricted so that there is a minimum loss of blood when the leg is shed. It is often more advantageous to part with an injured limb than to be inconvenienced by it. When one is the possesor of more than a dozen pairs of appendages, of one sort or another, the loss of a leg is no great tragedy — especially not when one can soon grow a new one in its place.

★

Rainy Weekend

By COSETTE MIDDLETON

There was a quality of endlessness
About the rain that made it hard to say
Or to remember: was it yesterday
It started, or last week? Or to profess
A hunch when it would cease. It might have been
The monotone that made it seem without
Beginning or end; the busy waterspout
Droned on and hinted neither if nor when.

At times we felt as though a sea-horse or
A jellyfish might float in through the door.
Through streaming glass we saw (or thought we did)
A Lost Atlantis and a giant squid,
And someone hopefully suggested that
We might rename our hilltop Ararat.

The Kestrel

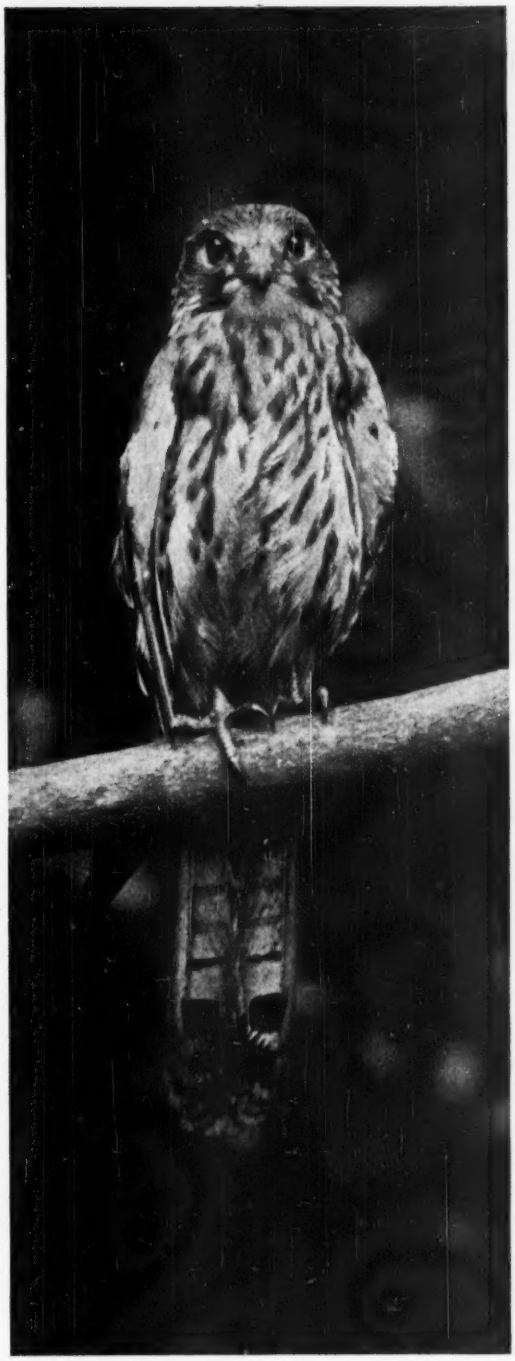
By H. H. PITTMAN

Photographs © by the Author.

OUR familiar little sparrowhawk is represented in England by a slightly larger falcon known as the kestrel. Both belong to an easily recognized group (*cerchneis*) distributed over most of the world, and about twenty species are known. Oceania, the fifteen hundred or more scattered islands northeast of Australia, seems to be the only place where kestrels of one kind or another do not occur. Most of them are brightly colored and they are, perhaps, among the handsomest of all the hawks.

The common kestrel is a red and blue hawk with large dark brown eyes, short legged and short toed, but with the long slender wings of a falcon. The head and nape of the male are blue or bluish-gray, and the back, scapulars and wing coverts reddish-fawn spotted with black. The long tail is gray with a single black bar and a white tip. The head of the female is reddish and her back is barred with black instead of being spotted. Her tail is evenly barred from base to tip. In both sexes the breast is pale rusty, or white sparsely streaked with black. The female is the larger bird and may measure two inches more in length than her consort. Seen in flight from above, the kestrel is definitely a reddish bird, but of a shade that blends with the landscape below.

The kestrel lives largely upon rodents and small birds. It has been known to bring down a bird as large as a pigeon, but I believe the enmity of most gamekeepers is unjust. There are rogue kestrels, satisfied to make an easy living when they are raising families of their own, but I think many of the crimes of which they are accused are perpetrated by an entirely different hawk, *Accipiter nisus*, the terror of the woods and a close relative of our sharp-shinned hawk.



The kestrel is a small European falcon, a relative of our so-called sparrow hawk.

The kestrel is a bird of the open country, frequenting both cultivated and wild land, where it preys upon mice and voles, small snakes, insects, and whatever small birds nest in the open. These are mostly pipits and larks, and I noticed on the South Downs that little birds living in the patches of gorse in the hollows, such as stone-chats and buntings, were quite indifferent to the hovering of a kestrel overhead, apparently feeling perfectly safe among the bushes. The habit of hovering is characteristic of the kestrels, and the only other hawks that I have seen attempt it are harriers, which occasionally stop to look and listen in mid-air. However, their larger wings make the effort look laborious.

The kestrel's nesting sites are frequently ledges on cliffs, old ivy-covered towers and buildings, abandoned nests of crows or magpies, and hollow trees. Many years ago I tried hard to photograph a nest but met with indifferent success. Having only a large stand-camera and an old-fashioned pocket-sized one with me, limited my choice of nests, and many plates were wasted

Like most falcons, kestrels use cavities in trees, ledges on cliffs, or deserted nests of other birds, for their homes.

before the accompanying pictures were taken. While not as good as I hoped, they are interesting to me because they are photographs of a nest I never actually saw!

The last nest I found was high up in a beech tree. This tree was very old, and, at about fifty feet from the ground, the trunk had broadened and then divided into two, each part continuing straight up. At some time lightning or a severe storm had broken one half of the fork off, leaving a ledge or shoulder on which dead leaves and decaying bark had accumulated. Kestrels had nested on this shoulder for years, I was told, and their eggs were quite safe because the abrupt swelling immediately below it made climbing hazardous if not impossible. Getting a rope over the extremely high branches would have been a major operation, and everyone looked upon the site very much as Gilbert White says the residents of Selborne regarded the famous raven-tree. With the aid of the longest ladders available I could just get my eyes slightly below nest-level, but could get an arm far enough over the edge to feel that there were eggs.

As the only other nest I had photographed had been in the dark interior of a hollow tree I decided to try to get some pictures of this one, and finally managed to construct a light support to hold the pocket-camera well above the nest. Field naturalists will notice something unnatural about the picture of the eggs for I had to rake them together to make a solid support to rest a stick against when measuring the distance they were from the lens. I have never seen a falcon's nest with the eggs close together. Usually they are widely scattered, possibly knocked out of place by the long wings as the alarmed bird takes off for its flight.

Having measured up at the nest I took the camera down to the ground and focused on a page of a book at the same distance, inserted a plate and climbed up again. It was necessary to go down after every exposure, but although many of the negatives were off-center I secured a few usable pictures. Later on, when the eggs hatched, I photographed the chicks in the same way, although I encountered an unexpected difficulty when taking measurements because I could not tell whether my stick was resting against their bodies or the soft material of the nest. The eggs had a creamy-white ground and were thickly clouded and spotted with reddish-brown. They looked as though they were spattered with dried blood!

A disturbed kestrel, leaving her nest, frequently dives or plunges straight down and no doubt often escapes death by this abrupt action. Possibly the reason is a desire to gain speed and enable the bird to rise quickly above the surroundings, for it always likes to be up. A close observer told me that although the kestrel may not assume fully adult plumage for several years, it will breed the first summer after hatching, when still slightly less than a year old. We have little reliable information about the breeding ages of wild birds, but the larger falcons, which assume mature plumage when about eighteen months of age, apparently commence breeding only in their third year. There seems to be a suggestion of a rule that birds living a long time breed later than those whose life-span is short, but there are so many exceptions, and apparently so many influencing factors to be considered, that there is no justification for inferring that the kestrel is a short-lived bird.

Country people often call (Continued on page 108)

Violet Fancier

By EDNA PECK ATWOOD

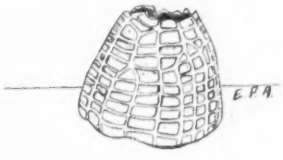
Illustrated by the Author.

Milkweed is a favorite plant with the great spangled fritillary butterflies.

SAID my merry-hearted grandfather comfortingly to my sister during a terrifying thunder storm: "A girl that was born to be hung, won't be struck by lightning." Neither fate has yet overtaken her, but here was I hung between earth and heaven and happy about it.

There was the peace of solitude. Only the regular, periodic clicking of the cables over, under, and over the pulleys on the towers timed the twenty-five minute ascent of the chair-lift of Mt. Mansfield. Vermont's loftiest peak had much to offer in indescribable beauty and grandeur. Dumb awe stilled my tongue at sight of mountain ranges of three States and the silver levels of distant Lake Champlain. Speech returned only when, treading the marked path over rocks and among the storm-stunted, wind-bent evergreens of the summit, I began to see birds of more northern latitudes. Then I called softly to my companion: "Here's a winter wren." He dived under mossy roots but came out again where she saw him. We found juncoes and a northern shrike, and we chased a gray-cheeked thrush about until we identified it. It was feeding a young bird. Farther back, where the towering mountain protected the trees, permitting normal growth, we had discovered a red-breasted nuthatch, myrtle warblers, and pine siskins.

But let us go back to that unfinished hanging. On the return trip another glorious panorama of mountain vistas would be faced, but the ascent found attention drawn to nearby things. Dense, mountain forest bounded the wide swath cut for the towers. The swath was full of low vegetation. I looked down on a tangle of weeds, small bushes, wild flowers, brambles, ferns. There were tiny rills from mountain springs where water-loving turtle-head flourished. From side to side and up and down, wherever the eyes roved, was something interesting. The beeches bristled pridefully with nuts, the balsam firs cuddled their erect cone children in gently swaying arms, the whole mixed forest was mysterious and beautiful. A squirrel barked at me, a nuthatch spiraled downward around a great bole, a white-throated sparrow flung his incomparable melody from the covert of the clearing-lane. Up, up, past Wildcat Station with its suggestive name I rode effortlessly. This was no usual hanging.



The much-enlarged egg of the great spangled fritillary butterfly.

I began to notice the butterflies below me. There were red admirals. There were so many cosmopolites that I marveled. The food plants of their caterpillar stage, nettles and thistles respectively, had been seen in the lane. Then, hovering over joe-pye weed blossoms, was what I had sought all summer and had not found — not one, but *two* great spangled fritillaries. By the difference in wing coloration, I knew I had glimpsed a pair. Their species is the focus of our story.

After all the place of discovery was suitable. True, I had not seen their larval host plant, but it would be there; for the violet grows even beyond the Arctic Circle.

All species of fritillary caterpillars feed on violets, yet it seems that the great spangled one has the primal legendary right to do so. His scientific name is *Argynnis cybele*, with the species name in honor of Cybele, the ancient Anatolian nature goddess who fostered the wildlife of the earth. Cybele was the goddess who haunted mountain and forest, the goddess who loved Attis and caused violets to spring from his blood when he died of wounds. So what is more fitting than that the feeding larvae of *Argynnis cybele* should love violets and violets alone? And does it not seem that the sober scientist who bestowed the name, did so with a smile, knowing that few would find the romance hidden there? I like these fabled names. Fables fix facts in the mind.

The spangles of our violet fancier are silver, as the name *Argynnis* indicates. He is an admirable fellow. He carries the Argynnid endowment around with him wherever he goes and keeps his fortune intact as long

as he lives. He is always solvent. Gypsy though he is, he does not dangle his coins from brow and neck but tucks them here and there among the scales beneath his handsome fulvous wings. We might say that those species of fritillaries that have no silver specie are his poor relations.

I recall my first encounter with the larva of a great spangled fritillary, and, by the way, I shall often dub this larva a "cat," as short for caterpillar. It was the special day for memories — our Memorial Day. The cat was rippling hurriedly over the garden's mellow loam. Such energy! Such haste to get somewhere! Apparently the goal was the berry patch. I bent over and scrutinized the unfamiliar trespasser. He is a nocturnal feeder and seldom seen.

The ichneumon fly that emerged from the chrysalis instead of a butterfly.

He had a velvety black skin with six parallel rows of tree-like spines as even and regular as a reforestation planting. Each spine-tree had a bright tan colored trunk for about half its length. The branches and upper trunk were shiny jet black. The odd little cat had a black face, squared at the upper corners with low horns. His brow and temples were bright tan. His face was quite hairy. He needed a shave. His length was one and one-quarter inches. Extended, he was a bit longer but not long enough to tally with his description in the books.

He was a challenge to me. His future had to be tabulated.

Since orthodox caterpillars do not travel until their eating days are over and they feel the need of a retreat in which to transform into the pupa stage of their existence, I must not lose sight of this cat. I had met him by accident; I would get acquainted by design. I boxed him with leafy currant twigs, sprinkled with water. Violets flourished on the garden margins, but it was unnecessary to use his proper food plant since he was now a cat without an appetite. The weather had been dry. My violet fancier did appreciate the water. He drank nearby drops eagerly. I tied mosquito netting over the box and laid it on its side so that he would be less apt to attach himself to the netting.

The chrysalis of the great spangled fritillary was hung from a sprig of currant leaves.

After a time the prisoner fastened currant leaves to the side of the box and wove a few threads, not like a cocoon but like a flimsy canopy or barrier, almost as if in the dim depths of his mind he had planned to make something and then had forgotten what it was. On June 1, behind his sketchy barrier, he spun a silk button on a leaf and hung himself from it by the tail. Solely for this hanging he had on the tip of his tail a cremaster with hooked pincers.

By ten o'clock the following day he shed his skin. He was a chrysalis and three-fourths of an inch long. The chrysalis varied in color from dark to rich, warm, light brown. In another day it was darker — really blackish-brown and shining. Its old spine-trees were replaced by sharp-looking tubercles.

To get a good light for sketching, I cut away part of the box, unavoidably breaking the web barrier. The chrysalis jerked sidewise repeatedly as if trying to fend off danger. Every day I examined it. It continued to be nimble. Surely I would have a butterfly in a few days. How thoroughly humbugged I was!

After an hour's absence on June 20, I entered the house and saw a wasp-like insect walking up a window curtain. My first thought was, "How did that creature get into the house?" The second thought was one of apprehension. I dashed to look at the chrysalis. Calamity had struck. There was a gaping hole in its side. I got a jar and canned the ichneumon enemy of the great spangled fritillary. Soon I added its picture to my growing rogues' gallery of such of its ilk as had thwarted me before.

Ichneumons are parasites. There are many, many species of them. Some are small, some large. This one was fifteen-sixteenths of an inch long from the tips of its waving antennae to the end of its body. Its family is classed as beneficial but I acknowledged no benefit from the murderer of my fritillary. The ichneumon's mother had laid an egg in or upon the body of my caterpillar. The egg had hatched into a grub that lived inside the cat's body and fed upon its blood. The cat had continued to develop but here was the cause of its dwarfed length. The fritillary larva had even arrived at maturity and become a chrysalis while the hidden deviltry of the parasite had continued. Now it consumed the developing butterfly and took over the chrysalis husk itself. In its turn, it became a pupa and an active one, too, inside the chrysalis. In due time it had reached its adult, winged, form, burst from its pupa, and gnawed its way to freedom through the side of the chrysalis. Such was the ichneumon's story. Surely grandfather would have said this chrysalis had been both hung *and* struck by lightning.

But you will wish to know what the ichneumon was like. It had a waspish look. It had four blue-black iridescent wings that it could fold flat, one pair over the other, on its back, in squash-bug fashion. Its six legs were dark and its thorax was dark. Its abdomen was bright tan, lighter underneath, except at the rear where the two final segments were dark. There was no visible ovipositor or egg-laying organ. Its antennae were

unusual. Each had a very conspicuous white section, from the middle half way toward the body. I had never seen this species before. The ichneumons I have known are specialists. They prey each on a special victim, i.e., on a selected species or genus. The presence of this fritillary destroyer in my area accounted for the scarcity of the butterflies.

In my locality in western New York, and in New England, the great spangled fritillary produces but one brood a year. It belongs to the Nymphs, a family of butterflies that make use of only four of their feet. The two front legs are dwarfed and hugged uselessly under their chins. *Cybele* flies about the last of June. The eggs require a month to mature. A female, caught any time from mid-August through September, and confined over violet plants, is apt to present her jailer with eggs. The eggs may hatch in twelve days. The tiny hatchlings secrete themselves at the base of the host plants. In the natural state they remain there without eating until the following spring. Exceptions to this rule have been known, but they are infrequent. To achieve the rearing of the larva, they must be kept cold.

The caterpillar of the great spangled fritillary feeds only on violets as its scientific name romantically indicates.

The successful pioneer in doing this was Wm. H. Edwards of West Virginia, who, in his wonderful, three-volume *Butterflies of North America*, published about eighty years ago, recounts his trials, failures, and successes in wintering cybeles. He finally sent some of the tiny larvae to Prof. Fernald in Maine. The little cats were put into small paper pill boxes and stowed inside a tin box. This box Prof. Fernald tucked into frozen sawdust under ice in his ice-house. In early March the box was returned to its owner, who lost a few larvae because of thawing them out too fast. Edwards found that they must be thawed very slowly, taking three days or more. Treated thus, all were feeding on potted violet plants by the fourth day. From ice to butterfly was 73 to 86 days.

A great spangled fritillary's eggs are shaped like tiny cones with the apex cut off so that they are as wide as high. The tops are like shallow saucers with nicked edges — serrated. Each egg not only has many (18) vertical ribs, but it also is checked off by cross-ribs. It is yellow in color.

Newly hatched larvae are dull green, but, as they grow and moult, they become darker with each successive moult until after the fourth one they are velvety black like my Memorial Day cat. The newly hatched larvae have only club-tipped hairs. Their every new costume has more elaborate accessories, until finally they are wearing the spine-trees.

Supervised cats, raised indoors on potted violets, are safe from parasitic foes. One gets butterflies instead of frustration by this more intimate way of propagation.

Butterfly study started in a small way many centuries ago. Perhaps the first observer to record findings was Pliny, the Elder, who, in the year 77, published his 37-volume *Historia Naturalis*, which still exists. Pliny's interest in natural phenomena caused his death in 79 (A.D.) when Vesuvius destroyed Herculaneum, Pompeii, and Stabiae. At that time Pliny was stationed off Misenum in command of the Roman Fleet. Anxious to make closer observations, he landed at Stabiae and was suffocated by gases from the volcano. So wrote his nephew, Pliny, the Younger, to a friend some years later.

Pliny's *Historia Naturalis* was compiled from notes filling 2000 volumes. The observations were his own and those reported by assisting contemporaries. So it might be said that Pliny's was the first Nature Association.

Holland's quaint English translation in 1601 gives us the following from Pliny's monumental work:

"There be insects with little hornes proaking out before their eyes, but weak and tender they be, and good for nothing; as the butterflies."

And from the same source, with the oldtime"s" rendered in modern form, we also find this:

"Many insects there be that breed after another sort; and principally of dew which setleth upon the Radish leafe. From it ariseth a little grub, and lo in process and tract of time it groweth bigger and gathereth an hard huske about her. This is called Chrysalis; and after some time, when the huske is broken, he proveth a faire flying Butterflie."

We must agree that entomology has come a long way since Pliny's day. But it is rather pleasant to learn that a studious old Roman broke the trail.

★

Greenstone of the Maoris

By NAN JOHNSON

Greenstone of New Zealand used for various purposes, including a shamrock brooch, a stickpin, two souvenir spoons with carved greenstone handles and a Maori axe.

THE recent popular book, *Kon-Tiki*, speaks of the Tikis that are found on many of the islands of the South Pacific. In New Zealand native Maoris, consider the Tiki to be a bringer of good luck, or as an amulet to ward off evil spirits.

The Tiki is the Maori's conception of the first man. It is a quaint, rounded figure with large round eyes set in a huge head. The arms and legs are tiny. The protruding tongue and nasty leer, make the Tiki a most unattractive creature, yet there are few Maoris who do not possess at least one of them. Some of these charms are intricately carved out of greenstone.

Greenstone is a type of jade and was once much prized for shaping into weapons or implements such as axes. Greenstone played much the same part among the New Zealand Maoris as wampum did among our Indians. This stone is as hard as flint and requires great skill in carving. It occurs in nodules and veins of serpentine rock, but is generally found in large boulders, most frequently on the west coast of the South Island of New Zealand. There are said to be six color types of greenstone, the iron content being responsible.

Since many Maoris are expert carvers and the Tiki is a favorite subject, it is common to see many of them wearing beautifully carved Tikis. Greenstone is difficult to obtain, so Maoris prize highly such pieces as they have in their possession. Many of them insist upon having it placed in their coffins when they die. As the Maoris do not inter their dead, but place the coffins on tables out in the open air, it has been a temptation to thieves to break open the caskets to obtain whatever greenstone might be there. This unscrupulous practice has led the Maoris of the thermal region of Rotorua, to use an island in a lake as a burial ground, and to place an armed guard there.

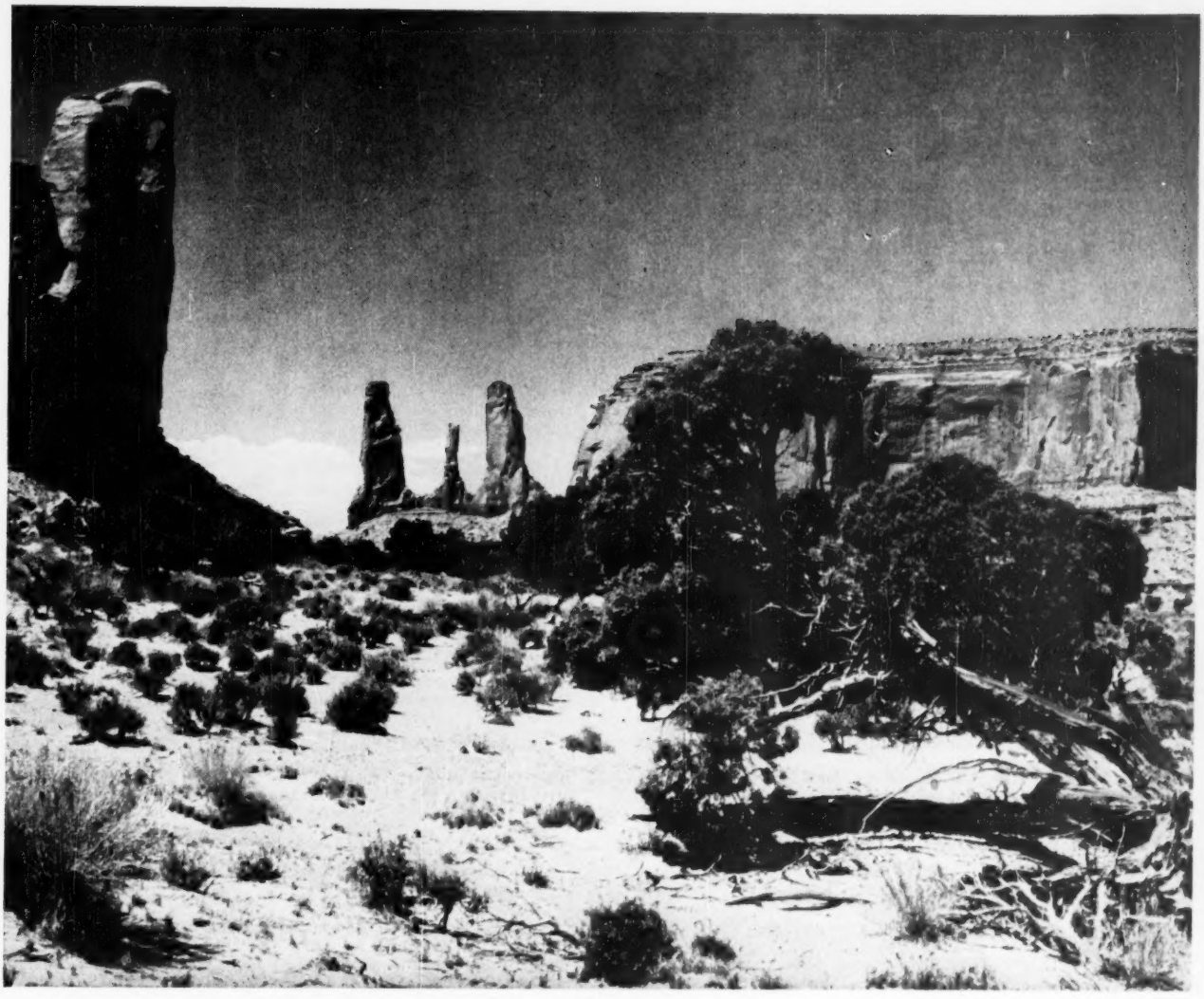
When the Maori wars ended, with the Treaty of Waitangi, and the natives adopted the white man's way of life, the Maoris no longer required weapons or implements made from greenstone, so a new use was found for it. Someone discovered that greenstone when cut and polished takes on an almost transparent, bright green color. So now it is in great demand for making into jewelry, ornaments and souvenirs. Of course, the most commonly used design is still the Tiki.

★

I Love the Toad

By ALLEN E. WOODALL

I love the toad, his blinking eyes,
His constant look of mild surprise,
His squidgy profile, and his feet,
So infantile and half-complete,
His look, as though he were not sure
That last live morsel was secure,
That latest slug that did not set,
And yet he could not quite regret . . .
But, all in all, I think the toad
Carries with him quite a load
Of ancient wise philosophy,
As well as bugs no longer free.



Silhouetted in grandeur, the picturesque Three Sisters of Monument Valley speak eloquently of the massive proportions of their wondrous rockland of mesas and monoliths. The taller pair tower 800 feet above orange-red sands of the desert floor. Once their laminated sandstones were shifting dunes of an age-old Jurassic waste. Cross-bedded by its fickle winds, unconformable layers were later pressed and finally cemented beneath vast overlying weight. Submergence of the region followed, to bring deposition of an overburden of limestone. In time the formations were lifted, partially stripped of capping strata, and now, before the attack of desert weathering, stand as defiant sentinel-outposts against abrasive wind and prying frosts slowly returning them to dunes all over again. Such is the spectacular cycle of these desert sands.

Rock Wonderlands

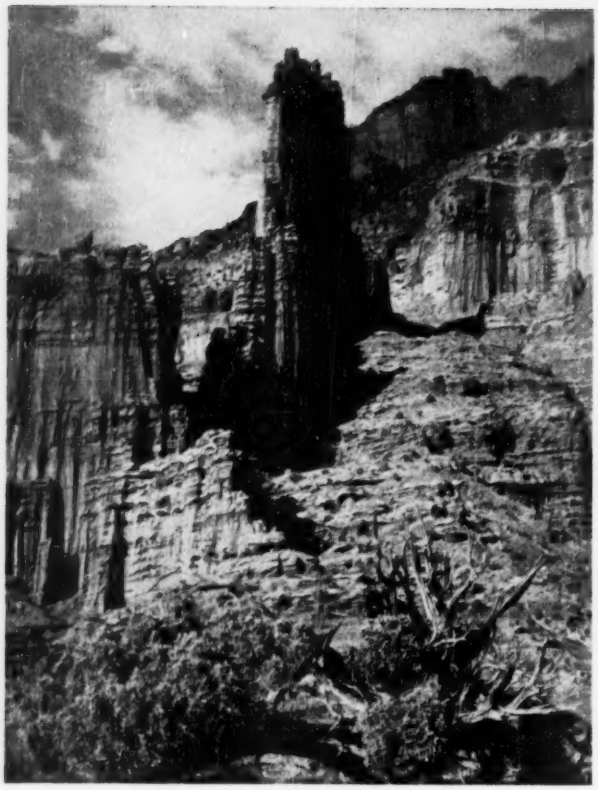
By JOHN LINDSEY BLACKFORD

Photographs by the Author

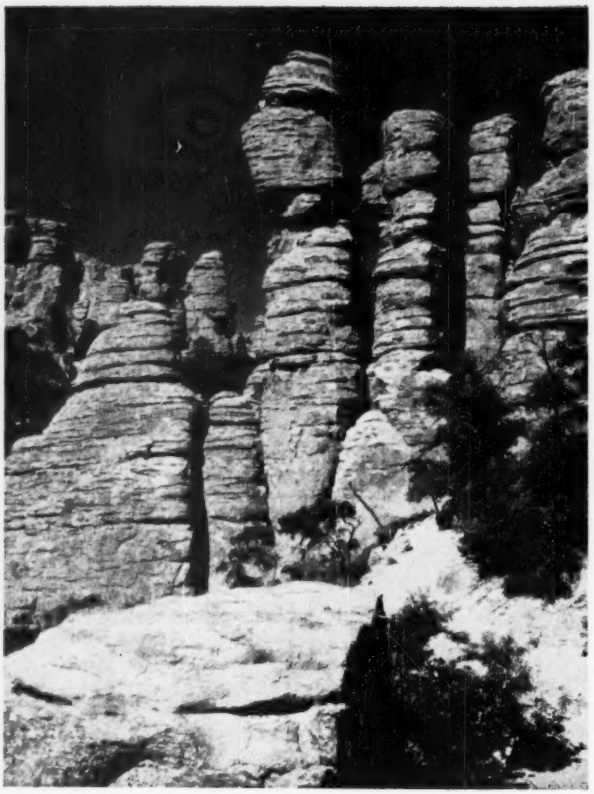
CARVED by flash floods, sculptured by frost, abraded and polished by driven sand, spectacular rock wonderlands continually astonish the traveler across our desert Southwest. For strangely, it is in the Land of Little Rain that water, erosion and weathering accomplish their most conspicuous work. Over vast areas, naked of Nature's familiar mantle of protective green, stripping and wasting of the bed rock by wind, sun and rain goes on, cleavage, chemical decay and crumbling of stone rule.

Typically, desert erosion shapes the land into numberless striking surface forms. Cliffs, mesas and buttes are kept in sharp profile. Rock-floored basins are scoured anew by every sand-laden gale. Flesh floods carve and gouge deeper each sheer-walled arroyo and barranca. Steep-piled outwash fans are built higher and higher against barren mountain fronts.

These active, age-old forces, promoted by favorable climate, have roughly dissected the mighty ranges, plateaus and fault-blocks heaved up eons ago by titanic earth-movements. With more delicate fingers they smooth canyon walls, drift cinders or sand, and carve columns from old lava flows. They stain massive strata, paint weird badlands, and expose brilliant bed rock all fantastically to shape and color the land. Across the desert today we discover unnumbered rock masterpieces — triumphs of the Supreme Artist's hand.

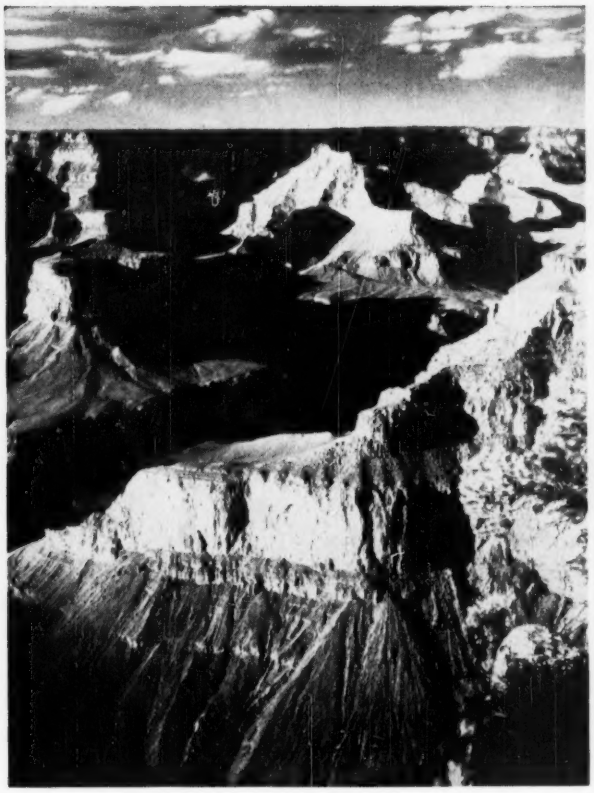


As though carved to play a sublime symphony, mighty Organ Rock rises in spectacular magnificance above surrounding red citadels of Fisher Towers, southwestern Utah. Resistant outposts of a steeply eroded mountain side, the Towers stand like castle turrets close to the banks of the winding Colorado. Note weathering effects upon the horizontal layering.



Like armies of fabled giants keeping step, huge stone colossuses mount steep ridges together in regular rank and file in southern Arizona's Chiricahua Mountains. Carved from colorful volcanic stone, these giant rhyolite pillars have been sculptured by the elements from vertically jointed formations, after cooling in characteristic columnar manner from ancient lava flows.

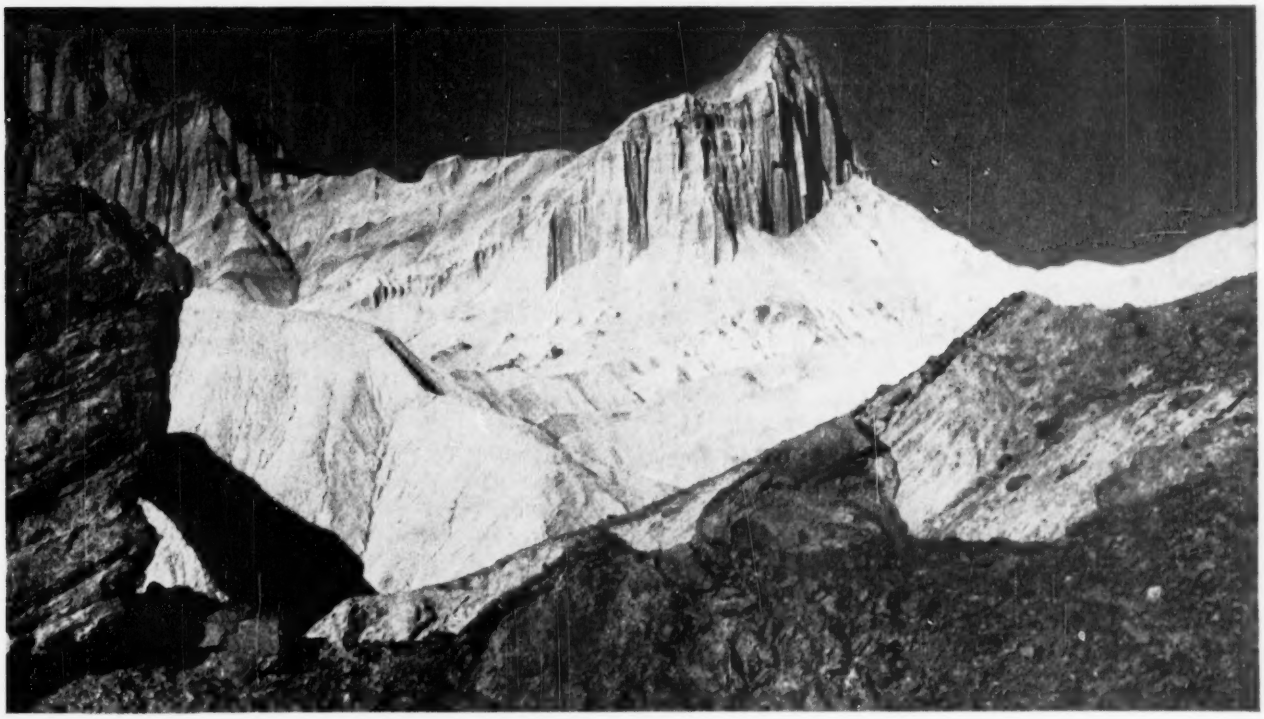
A majestic granitic outcrop just east of Prescott, Arizona. Barely hidden from the highway, lies a strange world of curious erosion forms. Here, through "The Gate" we look out between buttressed walls to follow storm clouds racing above the tumbled, boulder-strewn maze that is the Dells. Because granite is a tenacious rock of uniform structure, forces of weathering are largely restricted to surface attack, giving the impression that here we have discovered the very skeleton of the hills.



In the Grand Canyon of the Colorado geologists read from the black, chaotic Vishnu schists and coarsely crystalized Archaean granites of the Inner Gorge to the shark-tooth-studded limestones of the Permian Age, the record of the mighty making of Earth, and the beginnings of life.

Cave-pitted, green-lichened cliffs of roseate stone rise as striking ramparts to wall the verdant depths of Cave Creek in the Chiricahua Mountains, Arizona. Above dwarf evergreen oaks, beneath cobalt sky, they create a veritable canyon of color, another of Nature's matchless Wonderlands of Rock.

Manly Beacon, a massive aureate steeple of loosely cemented stone, rises from the weird and awesome beauty of Golden Canyon in Death Valley, California. Its soft layers may be traced as they dip to the left, while above upon the distant, shadow-streaked cliffs may be seen a renewal of the tough, black conglomerate that mantles the foreground slope. Golden Canyon, dividing the calico-colored foothills of Black Range, is a sulphur-colored labyrinth of scenic splendor.



Black-bellied Hamster

By ERNEST P. WALKER

Assistant Director, National Zoological Park

Photographs by the Author

The European, or black-bellied, hamster is much less known than the little golden hamster. It is larger and has different coloration. It has not been, as yet, bred sufficiently in captivity to be considered as a pet, but there seems no reason why it should not be.

THE BIG black-bellied hamsters, *Cricetus cricetus*, of eastern Europe and central Asia are similar in form to the well known golden hamsters, *Mesocricetus auratus*, but are much larger. They range in length from eight and a quarter to ten and a quarter inches from the tip of the nose to the base of the tail, which is three-quarter inch to two and a quarter inches in length. They may weigh from about three quarters of a pound to about two pounds, whereas golden hamsters measure only five to seven inches in length, with only a slight projection for a tail, and weigh from four to eight ounces.

The coloration above is a grayish-brown, and not so pure and clear as that of the golden hamsters. The underparts are almost black, but the hands and feet are white to buffy, and the light colored areas on the sides are buffy. Like golden hamsters they have large cheek pouches that open inside the loose lips and extend back of the ears onto the shoulders.

The unusual color pattern of this larger hamster is so striking that they are most attractive even though their backs and sides lack the clear, bright coloration of the lovely little golden hamsters.

No doubt, in parts of their range, black-bellied hamsters are common, but they are not so in zoological collections. Those we had in the National Zoological Park had recently been taken from the wild state, so were not tame, but I see no reason why they could not be domesticated, and be as interesting pets as the golden hamsters have become. The black-bellies probably do not multiply as rapidly as golden hamsters, for the females have only eight nipples, whereas golden hamsters have fourteen to sixteen nipples.

Golden hamsters are naturally strong-willed little folks, but through the many generations bred in captivity, in the few years since the parents of the present domestic stock were taken, they have become so tractable that they are now popular pets. No doubt the same progress can be made in domesticating the black-bellied hamsters when they have been systematically bred in captivity, and learn that not all people are hostile and cruel to small creatures.

In the wild black-bellied hamsters live in burrows in the ground and in crevices in rocky areas. They eat seeds and green vegetation such as corn, edible roots and garden products, frogs and insects. Food in quantity is carried in the large cheek pouches. Such food is stored to be eaten at leisure, and, in particular, to be available for periods of food scarcity. These animals hibernate during cold weather.

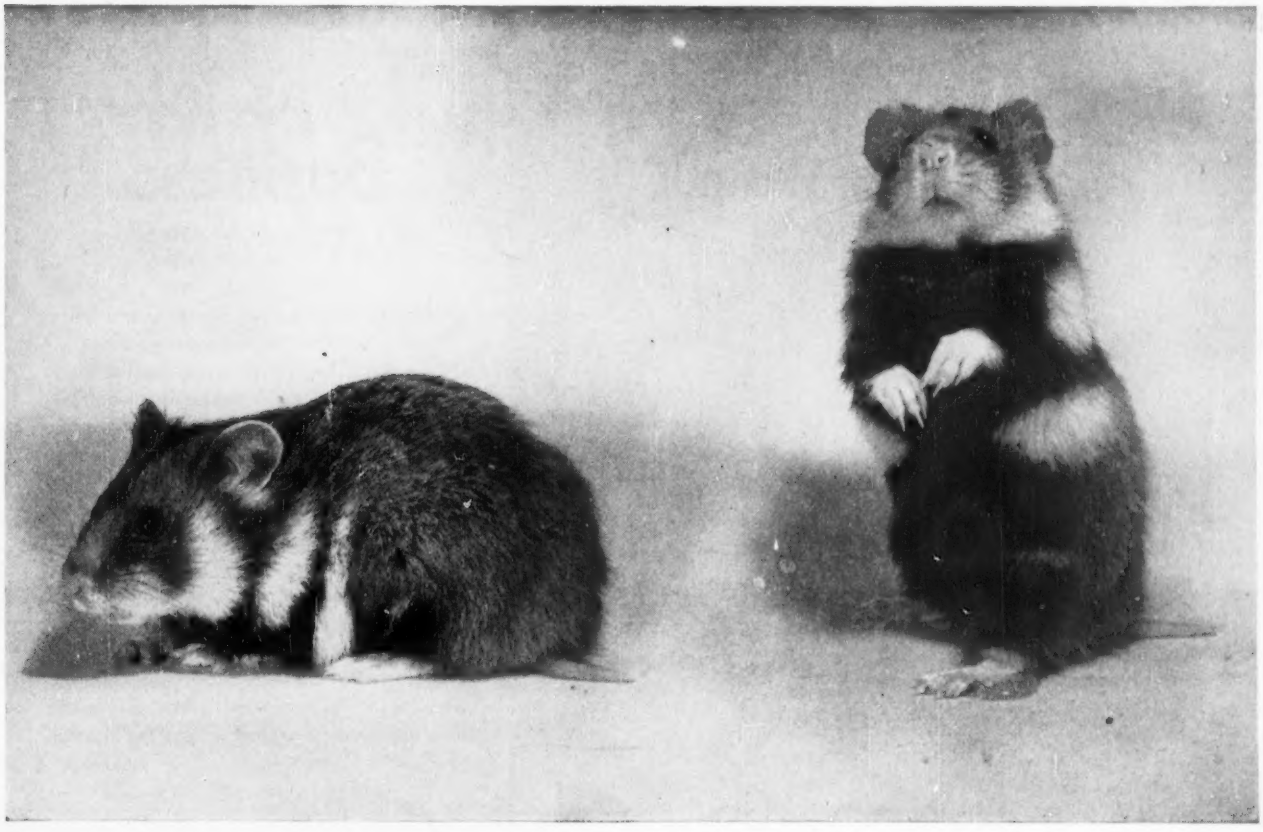
Studies of the black-bellied hamsters in Russia, where they are said to be pests, indicates that there is only one litter a year. It is entirely possible that those living in the southern portion of their range, where the hibernation season is not so long, may produce two litters a year.

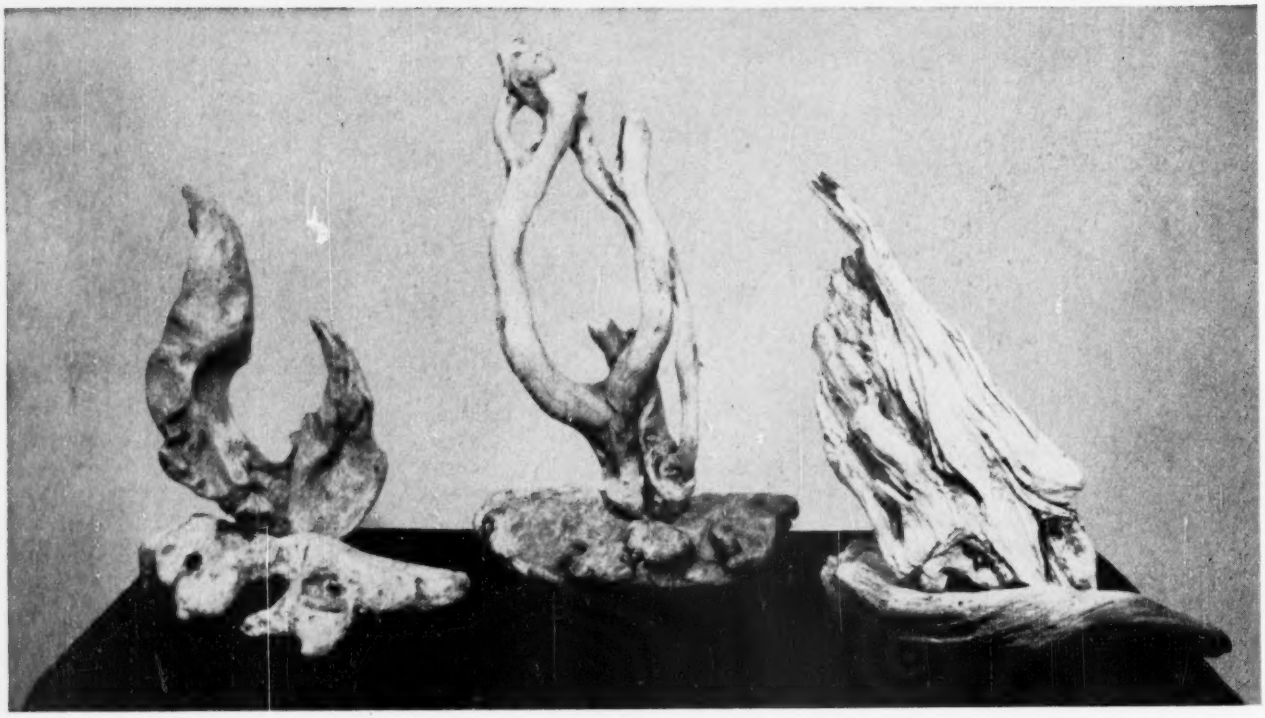
In spite of the fact that they are such large, conspicuous rodents surprisingly little has been written regarding them, and apparently they have not been kept as pets to any considerable extent.

Some use has been made of them in laboratories trying to find suitable subjects for experiments, but apparently this hamster has been fortunate, as it has not been found generally suitable for such purposes.

The English zoologist Ellerman considers there is only one species, with considerable local variation. These hamsters inhabit central Europe, from Belguim and northern France eastward into Russia and Asia Minor. The eastern limit of the range is not known.

A black-bellied hamster on a human hand shows its relative size. These little animals at the National Zoological Park in Washington, D.C., range in length from a bit more than eight to slightly more than ten inches, and weigh from three-quarters of a pound to two pounds, while golden hamsters may be from five to seven inches long and tip the scales at from four to eight ounces. The European hamsters have tails quite a bit longer than their golden relatives, whose tails are mere projections. Below, the black-bellied hamster standing on its hind feet shows the black coloration of its under parts. Its back and sides are a grayish-brown and lack the clear, bright coloration of its golden cousins. The European hamsters are not believed to be as prolific as the goldens, and they are fortunate in not proving to be valuable for laboratory experiment. In Russia the hamsters are said to be so numerous, however, as sometimes to be pests.





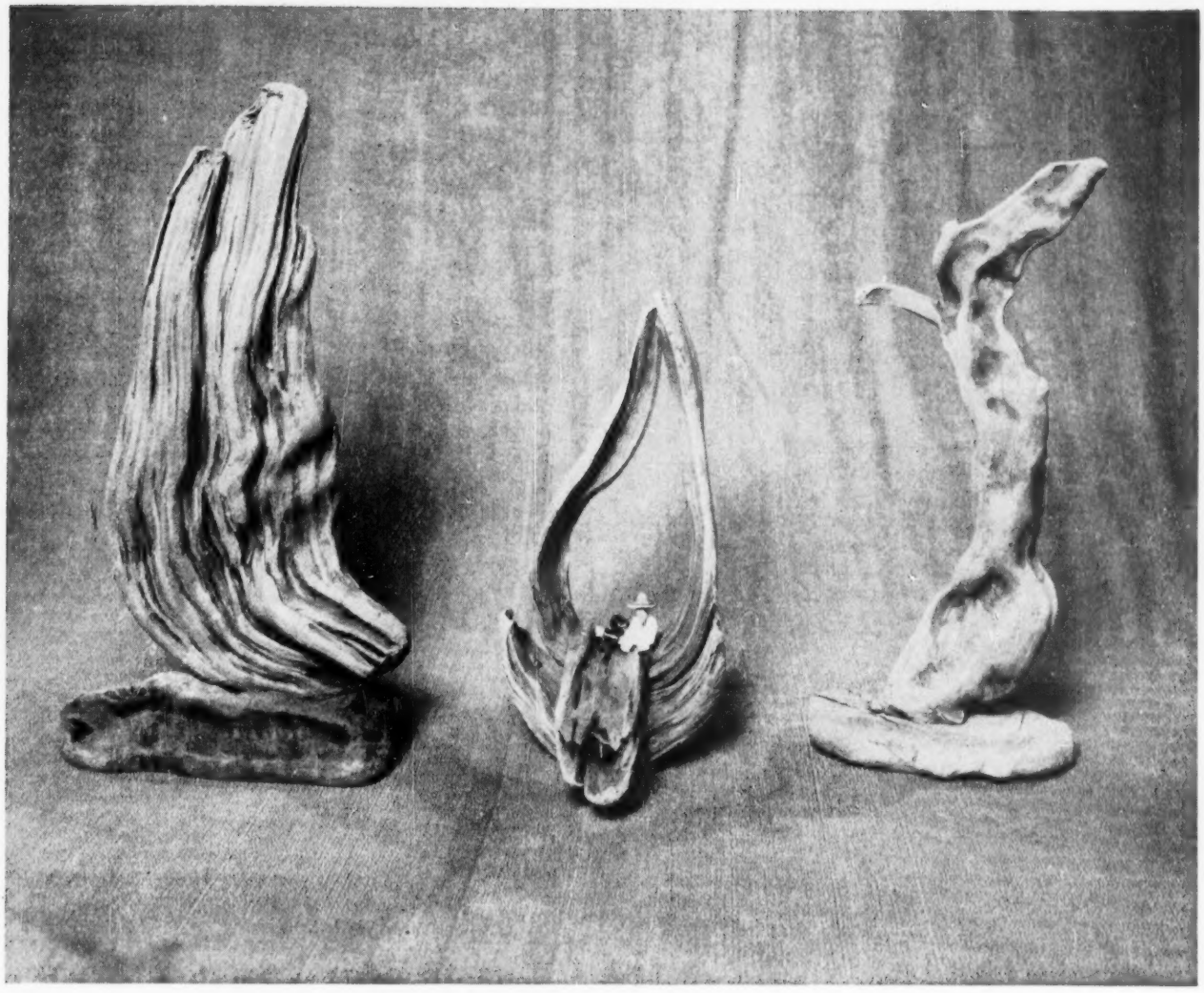
Some of the bits of driftwood that have been cleaned, but otherwise unchanged, and recommend themselves for use as "conversation pieces," or for flora decoration. Below, Evelyn M. Scott, a partner in "Driftins", displays some of the products of beachcombing that were shown at the Home Show in Portland, Oregon.

Tides Yield Hobby that Turns into Business

By A. ROBERT SIMMONS

SOME twenty years ago Mr. and Mrs. A. N. Wreisner lived on the Oregon coast. They found a hobby in walking along the beach, picking up bits of driftwood upon which tide and time had done a task of sculpture and ageing. Gradually they built up a collection of odd pieces, which, with a little imagination and working over, became interesting and attractive things for decoration and other uses. To them driftwood was more than something for the fireplace.

From time to time friends showed special interest in this piece or that. Some pieces were loaned for exhibition, others were sold. Thus was born the idea of turning the bounty of the tides into a business. A neighbor,



More of the unique pieces of driftwood that have been made into attractive ornaments for coffee table, mantel and other decorative purposes. Below is one of the larger pieces, standing nearly four feet high and suited for a garden ornament Note the large rock embedded in the wood at the joint of the branch.

Evelyn M. Scott, was also interested in such a venture and, joined with the Wreisners to form a company called "Driftins," now a going concern in Beaverton, Oregon.

The first shop was set up in the Wreisner's utility room. Later a shop was built and equipped with tools with which Mr. Wreisner can adapt the products of his beachcombing. All pieces, however, are kept in their original shapes. If a piece is to be prepared for a "conversation piece" for coffee table, mantel ornament, or other decorative purpose, it is cleaned and the qualities inherent in its weathering in the ocean brought out. Some pieces seem to demand being made into table lamps. Some larger pieces are suited for decoration in a patio or an outdoor garden. Some bits appear most suited for use in connection with flower arrangements, or to serve as figurines.

Beaches are combed for the flotsam of the tides, summer and winter. The vagaries of the high tides often carry choice bits into rocky and rugged spots. So the gathering is often an equally rugged task. The Wreisners say that

In his shop at Beaverton, Oregon, Mr. Wreisner studies the possibilities of a piece of driftwood that he is fashioning into a lamp. Many of the pieces collected require study to determine their most effective use, and often imagination is most necessary.

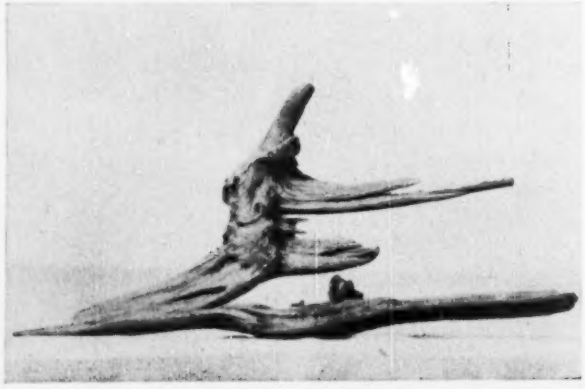
some of the most difficult spots to get to seem to yield the most interesting and valuable pieces.

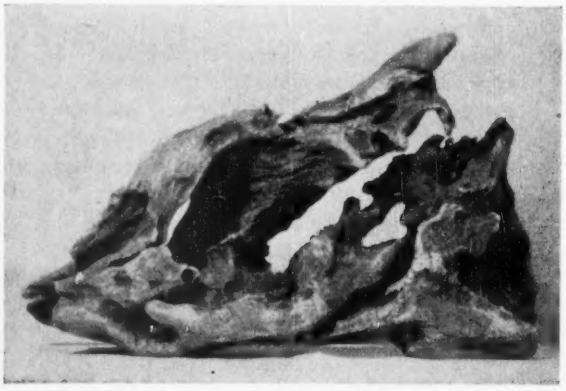
Traveling the currents of the ocean, some of the specimens collected have been on the way for many years. Many have come across the wide Pacific, or had their origin on some far-away Pacific island. This is proved by the pieces of foreign woods often found during the "operation beachcombing."

For those living near beaches driftwood has long been favored for the fireplace. Saturated with sea salt, such pieces burn colorfully, once they have been dried out. Thus much beachcombing for this purpose alone is carried on by seashore dwellers all over the world.

Driftins, Inc., has, however, proved that the products of time and tide can serve other purposes. For collectors, gathering materials of this sort provides an interesting hobby, as does the collection of pieces of weathered trees from forest and mountainside. So dwellers on ocean shores, or along the waters of a gulf, may certainly find interest in the flotsam cast up on the beaches. They may even find profit, as did those who now conduct this unique enterprise.

It took many years for sand, rocks, tide and water to fashion the piece at the left, below. It suggests a piece of imaginative sculpture, perhaps symbolizing the wind. At the right, below, is an interesting piece made by combining two pieces of driftwood.





Those Elk Again

ANOTHER elk hunting season has come and gone in the Teton Management Area, as it is called, and the problems surrounding the control of the southern Yellowstone elk herd still remain unsolved. Also unresolved is the matter of principle that is violated by permitting the shooting of elk within the boundaries of Grand Teton National Park.

Let us be briefly historical. Following the proclamation of the Jackson Hole National Monument by President Franklin D. Roosevelt, this area became a center of controversy. Its administration as a National Monument was blocked for several years, partly because the Wyoming Game and Fish Commission was jealous of its prerogatives with respect to elk hunting in the State. Finally a compromise was worked out by which a new Grand Teton National Park was created, bringing within its boundaries most of the lands in the Jackson Hole National Monument. This became law on September 14, 1950.

One section of this Act provides that the Wyoming Game and Fish Commission and the National Park Service "shall devise, from technical information and other pertinent data assembled or produced by necessary field studies or investigations conducted jointly by the technical and administrative personnel of the agencies involved. . .a program to insure the permanent conservation of the elk within Grand Teton National Park, by hunters licensed by the State of Wyoming and deputized as rangers by the Secretary of the Interior, *when it is found necessary for the purpose of proper management and protection of the elk.*"

This compromise was accepted with reluctance by many conservationists, some of us with the conviction that this kowtowing to the pettiness of Wyoming game authorities would be proved unnecessary and unwise. It has been so proved.

There are between 15,000 and 18,000 elk in the southern Yellowstone herd. They summer in the high country of the southern part of Yellowstone National Park and the country contiguous thereto. They migrate from the high country when snows force them out. There are too many elk in this herd for parts of their summer range, and far too many for their winter range, which is in bad condition, both on the National Elk Refuge and on U.S. Forest Service lands. These conditions constitute a serious threat to the local watershed. Reduction of the herd is therefore necessary.

Under the compromise worked out and enacted into law, it was provided that shooting of the animals could be allowed, if agreed upon by the Wyoming game authorities and the Park Service, in those portions of the park that lie east of Snake River and Jackson Lake, and north of the old boundary of the Park. This area includes the infamous Antelope Flat section where elk slaughters have taken place in the past, and which even the Wyoming Game and Fish Commission has not had the courage to ask reopened.

According to the law the "permanent conservation of the elk within Grand Teton National Park" is the goal. Actually there are no more than 200 elk within the Park, about half of these there because of a habit established through feeding practices of earlier times. In their migration a maximum of 30 percent of the animals pass through the park, being within its boundaries for a few minutes in some cases, a little longer in others. None linger long.

The law went into effect about simultaneously with the opening of the 1950 elk season, which normally runs from September 10 to October 31. Rather unreliable figures are available for what happened that year. The Wyoming authorities say that 685 elk were killed on park lands, "or immediately adjacent thereto." A figure of 2253 animals killed outside the park in Jackson Hole is given.

In 1951, when snow came early, about October 20, the elk came down en masse. In that season 4800 elk were killed, 189 of these on those park lands east of Jackson Lake opened for shooting by request of Wyoming authorities. Six hundred hunters were sought by the State for deputy rangers, and proved hard to get. So only 30 percent of the licensed hunters within the park got an elk, compared to 50 percent outside.

For 1952 the Wyoming Game and Fish Commission asked that the Berry Creek area, west of Jackson Lake, which never should be opened, also be made available. It was. Snow did not come and the elk herd remained in the mountains, so the season was extended to November 15. The State estimates a total kill of 3500 elk. But 455 deputized hunters — the State wanted 1200 but could not get them — bagged 27 elk within the park. Eleven of these were killed in the added Berry Creek area by 16 hunters, and in this area a Park Service patrolman, in the field for 51 days, saw 30 elk.

It all adds up to a silly piece of business that is not helping to bring the southern Yellowstone elk herd within bounds of its available range. And it is perpetuating an invasion of a National Park for shooting that is not justified by any contribution to elk management. Furthermore, there is ample evidence that the Wyoming authorities are not really interested in reducing the herd for fear that the elk hunters would not be happy if there were fewer animals, and thus less chance for hunting success.

In our opinion it is about time that the National Park Service took off its heavily padded gloves and stood up for principle with bare fists. That, indeed, the Service enforce the law by insisting that "proper management and protection of the elk" is not achieved by shooting on park lands. And if the Wyoming Game and Fish Commission is really interested in proper control of the herd they have only to adjust the hunting seasons to accord with weather conditions — which they can legally do — and pay some attention to known facts with respect to the activities of the animals. Politics, prejudice and pettiness have no proper part in the handling of this southern Yellowstone elk herd.

The Forest Land "Steal"

By CLEVELAND VAN DRESSER

U. S. Forest Service Photographs

Tailings left by gold dredging along Prichard Creek, Coeur d'Alene National Forest, Idaho.

IT SEEMS almost inconceivable that a national policy of administering millions of acres of public land can be violently disrupted, and our people, generally speaking, be totally unaware of it. Most of us have heard of the great timber and land grabs in the past that were engineered by unscrupulous promotors. We are accustomed to think that such wholesale land manipulations *are* a thing of the past; that what remains of our once vast natural resources is administered with some semblance of order; that exploitation on a widespread scale is ended.

What comes as an appalling shock is the inescapable fact that our public land today — right now — is the subject of the most vicious and subtle land grab in our history. Areas of magnificent timber, huge stretches of verdant pasture land, and scores of magnificent lakes and streams are being virtually taken away from the people of America by a system of land manipulation that is striking at our great public forest resource. *And it is being done with the blessing of the laws of the United States of America*!

The source of this frightening situation lies in the Federal mining laws; or, more exactly, in a totally unanticipated and selfish interpretation of these mining laws.

There are today some 340 million acres of publicly owned land in the United States. The U.S. Forest Service administers almost half of it; in dollars and cents value, considerably more than half. This service, as formally set up in 1905, is charged with the task of administering the resources of this huge area for the good of all the people. Timber is generally allowed to be cut only on a sustained yield basis, thus insuring a never-ending supply. Watersheds are protected to guarantee forage for herds of livestock; suitable hunting, fishing, and recreational areas are for public use.

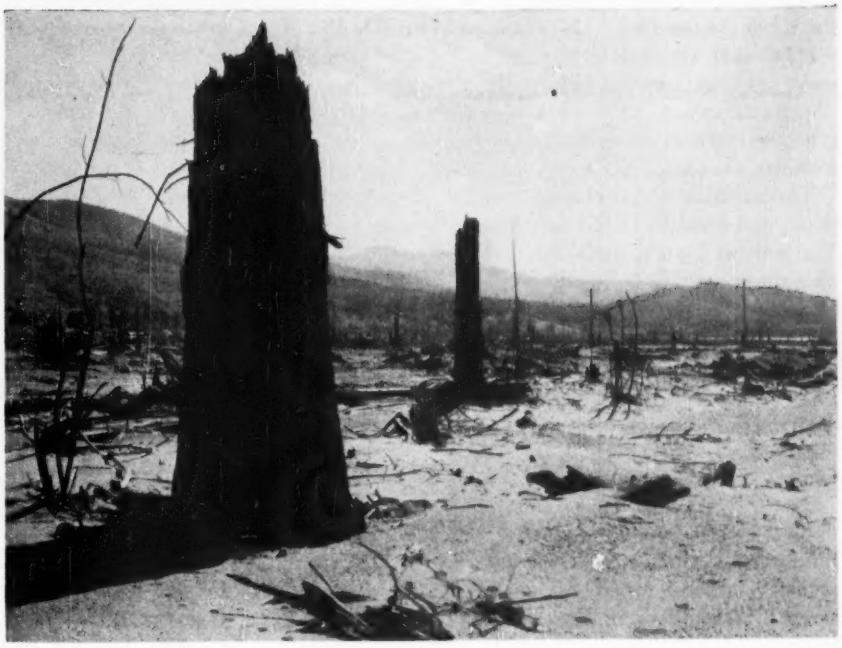
It is this public land that is the target of the phony "miner," a particular breed of person, with questionable morals and motives, who sees in the Federal mining laws a chance to get rich at the public's expense.

The Federal mining laws came into being in 1872. At that time America was expanding westward, and every conceivable inducement was offered the miners to unearth the minerals needed for a growing young nation. In order to stake a claim a miner made a "discovery" of minerals in sufficient quantities to "warrant a prudent man in the expenditure of further capital to produce a paying mine." Further, the mining laws gave the filer of the claim possessory rights to all surface values of his claim — water, timber, grass — as well as anything beneath the surface. Mine claims, either lode or placer, average about twenty acres each, and the laws were such that, by forming associated groups, there was virtually no limit to the number of claims a man could file. The laws also stated that filing of mine claims should be done at the county seat, not with the Federal agency that administered the public lands upon which the claims were staked.

In order to "go to patent" — obtain outright possession of the land constituting a mining claim — it is necessary for the claimant to prove he has done $500 worth of assessment work for five years. He then pays Uncle Sam $2.50 per acre for a placer claim, and $5.00 an acre for a lode claim, and the property is his to do with as he pleases. The "discovery" proviso of the mining laws was so vague that a large percentage of the 340 million acres of publicly owned land in the United States was vulnerable to seizure via the mining laws.

In the past 81 years the use of public lands has expanded many fold, *yet the mining laws are virtually the same as they were back in 1872!*

Misuse of these mining laws has been going on for



View in the valley of the Coeur d'Alene River, near Kellogg. First to go was the giant cedar along the stream. Then a polluted stream spread tailings over the valley floor. Then smelter fumes killed the timber on the surrounding hills of the Coeur D'Alene National Forest.

many years, but in a relatively small way, compared to what is taking place now. Several things happened after World War II. Land values increased and the price of timber skyrocketed. Furthermore, people began to feel cramped in large cities and desired to move out to the "wide open spaces."

During the past six years the misappropriation of public land through misinterpretation of the mining laws has been shocking. I have recently completed a 20,000-mile tour to investigate this situation, and what I have learned is well-nigh unbelievable.

There is hardly a single National Forest west of the Mississippi River that is not being gouged by mining claims. It would literally take a book to list the bare case histories of distortion of the mining laws, and the tricks used by phony "miners" to gain control of valuable public property. For purposes of brevity, I shall describe a few of the more glaring examples.

Throughout the Pacific Northwest, mostly in the States of Oregon and Washington, standing timber is the real sought-after prize of the questionable mine claimant. The magnificent stands of Douglas fir, ponderosa pine, sugar pine, hemlock and cedar are worth from $15 to $50 per thousand board feet, and it is not uncommon for a twenty-acre tract of land — the size of the average mine claim — to have from twenty to thirty thousand dollars worth of timber on it. There is, more often than not, sufficient mineralization in the land to warrant a "discovery." When even sand, gravel, pumice and cinders are classified as "minerals," it is easy to understand why filing a mining claim is simple. It is equally simple to understand why a man files a mining claim on such land. It is the timber he wants, and he is using the mining laws to try to get it. If he succeeds in getting a patent, he stands to make around twenty thousand dollars on an investment of about one thousand dollars on only twenty acres of land.

Right now there are more than six thousand mining claims filed in the States of Oregon and Washington that the Forest Service knows about. And, judging from the record of the past six years, less than five percent of these claims are for mining purposes. The rest have obviously been filed in the hope of gaining possession of the timber on the land. Each claim represents at least twenty acres; many of them are filed as "group claims" of 160 acres each. Simple arithmetic gives you some idea as to the total acreage. And as long as the claimant holds on to his claim, the Forest Service can not touch the timber.

Such a situation withholds millions of dollars of income annually from the people of the United States. It is the policy of the Forest Service to sell the mature timber on the open market, the money thus accrued to go to the U.S. Treasury and the county in which the timber is sold on a 75-25 percent basis. Mining claims can and do rob the people of the very timber they own.

Throughout the states of Montana and Idaho, the mining claimant presents a double threat to public lands. Choice hunting areas are blocked off, with some claimants having the temerity to set up packing outfits to guide hunters in the big game country. In other instances mine claimants file on land bordering choice lakes and streams and use the surface rights proviso of the mining laws to keep the public from using those areas. In addition, Montana and Idaho are plastered with mining claims on valuable stands of timber. In all, it is estimated that fifteen thousand mining claims have been filed in those two States alone.

Claims throughout national forests are filed on land that promises to be of varied value. The claims may appropriate desirable recreation land or homesites, be at the intersection of highways and valuable for commercial purposes, or be near the entrance to national parks and monuments where the tourist traffic is heavy. They may be on land that is to be used for a state highway. These and other reasons are objectives of

the mining claim filer. The situation has reached such a stage that the Forest Service cannot plan a single move without automatically taking into consideration the trouble it will have with mining claims. Even such a necessary thing as the construction of an access road within a national forest runs into mining claims.

There is also a facet to this situation upon which no dollar and cents value can be placed. In order to show "assessment" work on a mine claim, bulldozers are sometimes used by phony "miners" in an effort to convince the Forest Service that a serious attempt is being made to extract minerals from the earth. An hour's work with a bulldozer can rip up a sizable piece of land. Such operations fool nobody, but they do suffice to fulfill the assessment requirement of the mining laws. What they do to the landscape can be left to the imagination.

The legitimate and reputable miner has nothing to do with the twisting of the mining laws. He goes about his business in an honest manner and his discoveries and development of mineral assets are of great importance to the nation. He has the respect and cooperation of the Forest Service. Indeed, in view of the many "phonies" with which rangers have to contend, many of them have expressed the wish that more honest mining operations could be developed on public lands.

I have talked with a number of officials of legitimate mining companies and they have said that the Forest Service is falling down on the job of contesting obviously false mining claims. The laws are on the books, but they are not enforced, seems to be the opinion in certain quarters.

On the surface this may appear to be so, for the mining laws do state that before a man can get a patent — outright ownershop — of a claim, he has to prove the mineral content is there, and also prove he has done the $500 worth of assessment work required by the laws. However, a brief explanation of how these laws work in actual practice may show what the Forest Service is facing.

For one thing, there are considerable areas of public lands that have sufficient mineralization to pass all requirements of discovery, yet do not contain sufficient minerals to warrant commercial mining. At the same time, these lands support valuable stands of timber worth far more than the minerals beneath the surface. Yet when a patent is granted on the land, the miner gets the timber.

It is absolutely impossible to contest all questionable claims. It costs $500 to contest a single claim, and with 15,000 such known claims in Montana and Idaho alone, that runs into money. The Forest Service has neither the money nor the personnel even to begin to investigate any but the most blatantly false claims. There are only two mineral examiners for the entire Forest Service, and the testimony and evidence of a mineral examiner are necessary in contesting the validity of a mining claim.

Even if the Forest Service does protest a claim, and takes the necessary time and money to prove its case, *the claimant can turn around and re-file on the same ground the very next day and the Forest Service is right back where it started from.*

The phrase "mining claims the Forest Service knows about," is fraught with meaning. The Forest Service actually has no idea of the total number of mining claims filed on any given area. Fantastic as it sounds, this statement is absolutely true. The Federal mining laws state that claims must be filed at the county seat, not with the Federal government. If any kind of record is to be kept of mining claims it will necessitate the checking of thousands of county records *every week*! And, even at that, legal descriptions of mining claims are often so vague it is impossible actually to locate the claim on the ground.

Another reason the Forest Service can seldom investigate a claim, unless the owner is actively engaged in illegal practices, is that the burden of proof falls upon Uncle Sam. The filer of a mining claim can make the most fantastic statements, and it is up to the Forest Service to prove them untrue. One of the favorite "dodges" is for the miner to state that his "discovery" is deep down in some caved-in mine tunnel on the property. In order to prove he is wrong (or lying), the Forest Service would have to reopen the tunnel.

However, when the claimant attempts to go to patent, the Forest Service does have a chance, for positions are reversed. The burden of proof is then upon the mine claimant.

In thousands of cases the mine claimant just "sits tight" on his claim. This is especially true where valuable stands of timber are involved. It is virtually impossible to oust a man from a mining claim. In the meantime, he holds valuable property, pays no taxes on it (except in a few isolated cases), and the public is excluded from using it.

In case anyone thinks the evil of phony mining claims is exaggerated, here are actual figures. During the past ten years, about one million acres of public lands administered by the Forest Service have gone to patent under the mining laws. On the whole, mines on less than fifteen percent of that land ever produced minerals in commercial quantities. The 85-plus percent was used in whatever way the owner saw fit, and certainly mining was not one of the uses.

In Oregon, right now, one man has tied up three and one-half *billion* board feet of valuable timber — timber that belongs to the people of the United States. This timber cannot be sold until the mine claimant gives his permission to cut it. The fact that he can not sell it, either, does not rectify the situation. It is a waste of a great natural resource, and America can no longer afford to waste its natural resources.

Of such character are the Federal mining laws, and manifold are the evil situations that spring from them. A number of remedies have been suggested, some of which are in the form of (Continued on page 108)

Although white in an infra-red photograph, the conifers in the foreground of the picture were in the red belt that freakish weather created in the Colorado Rockies.

"Red Belt" in the Rockies

By RICHARD G. BEIDLEMAN

Photographs by the Author

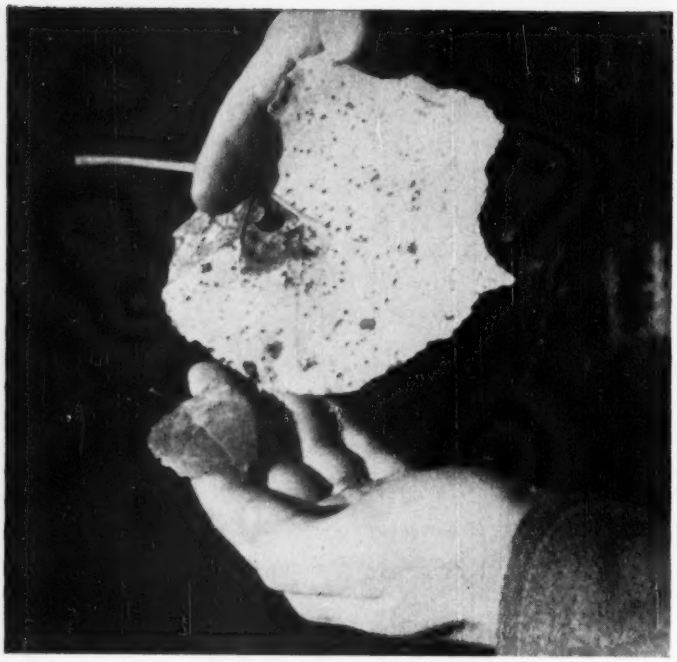
IT HAD been one of those winters when the mourning doves lingered instead of flying south. For days the sun, moving daily across a cloudless sky, had warmed the air and the earth beneath. Near the end of January, when blizzards should have been shrouding the Colorado peak tops, the temperature had edged towards sixty degrees, and there was a touch of spring on the mountain land. The leaf buds of the aspens were swelling, chipmunks had forsaken their underground burrows for a scamper through the woods, and in the forest conifers, especially the lodgepole pines, the sap had begun moving and the needles were releasing their precious reserve of water.

Then, almost without warning, winter descended, roaring down out of Wyoming in the teeth of a howling gale. The mercury dived to zero, then forty below. Along the mountain road cuts and across the ridges the wind whipped the trees, speeding the moisture from the foliage. With the wind came snow, swirling into the forest to cover the earth and mantle the branches, leaving little doubt that a tardy Indian summer had passed.

When April came to the northern Colorado Rockies, the olive-green lodgepole pines, in swaths across the mountain saddles and along the moraines, literally overnight, had become spires of rusty brown. Tree doctors were baffled, according to the newspapers, but self-styled experts immediately accused the cloud-seeders with their silver iodide crystals. Passing tourists, taking in the scene, rushed home to write their Congressmen about the dire need for more beetle-control funds. But the real explanation lay in January's weather, which had brought "red belt" to the Rockies.

The causes of the red belt or winter kill phenomenon are less obvious than the graphic display of the malady. Essentially, however, the red coloration is caused by dehydration and consequent burning of the conifer's needles. Winter warm spells have a tendency to start sap movement in a tree and encourage transpiration from the formerly dormant leaves, the removal of leaf moisture being accelerated by bright sunlight and dry winds. Because the ground, and even the tree roots, usually remain frozen during the brief warm periods, a tree is unable to replenish water given off from the needles, and these literally burn up, turning red with the onset of spring. Examination of an affected tree shows that foliage protected from drying by a snow cover or other shelter remains unharmed. Interestingly enough, bluish-colored conifers like the blue spruce and white fir are seldom affected by winter killing, because of a resin-like covering on the needles.

When certain factors of topography, such as ridge tops or road cuts, focus the winter kill into belts or contour bands, as often happens in mountainous areas, the "disease" is known as "red belt." It was this phenomenon that struck at the northern Colorado Rockies in the winter of 1951, leaving acres of copper-hued lodgepole pines and other conifers. Similar weather attacked the ponderosa pines throughout southern Colorado, prophetically enough, the same region where an identical epidemic had taken place twenty years earlier.



What the aspen leaves lost in numbers, due to the untimely weather, they made up in size. The picture shows a normal leaf contrasted with a gargantuan one caused by the "red belt" conditions.

Winter kill has struck at many forests throughout North America in the last half-century, sometimes producing drastic damage. In a three-year period from 1909 to 1911 more than 40,000 acres of coniferous trees in Montana were completely destroyed by the amazing workings of the weather, and during the winter of 1924-1925 many forests in the Pacific Northwest were laid waste by freak vacillations of the winter climate. Winter kill devastation has taken place at least twice among the ponderosa pine forests of the Dakota Black Hills, in the winter of 1909, and more recently in 1943, and spectacular red belt epidemics have been observed in British Columbia.

Although winter kill is most familiar to westerners, as attacking their mountain trees like the lodgepole pine, ponderosa pine and Douglas fir, it has also left its mark on the eastern woodlands. In the winter of 1948 winter kill in the Adirondacks, New York, was the worst on record, defoliating red spruce, hemlock, white pine and balsam fir. Although the local conditions were, different, the story had been the same — bright sunny days, wide fluctuations in temperature, excessive transpiration, and destruction.

In the Colorado Rockies the unusual weather that produced winter killing among the conifers also affected the broad-leafed trees, although in a somewhat different manner. The warm January days that caused transpiration in the pines stimulated bud development by the beautiful quaking aspens, and the subsequent temperature drop took its toll of bursting leaves. In the late spring the few remaining leaf buds made up for the loss of foliage through gigantic growth, their leaves exceeding by many fold the normal size.

Colorado's red belt pines, unlike the aspens, have made a less spectacular although a successful recovery from the ravages of winter weather. Trees whose protected vantage point left them with only a scattering of red needles readily replaced the dead leaves the following season. Those trees in the heart of the red belt, however, whose burnished foliage extended from earth to crown, dropped their red needles during the ensuing winter, and, within the year, had become cone-studded skeletons amid the green forests of the Rockies.

★

Do You Know Plants from Animals?

By MABEL IRENE HUGGINS

HERE are listed the names of twelve plants and animals. Half are plants, half animals. Can you match them with the right definitions in the second list? Answers on page 108.

1. sisal	a. a kind of kangaroo
2. sisel	b. certain varieties of apple trees
3. wallaba	c. an Australian sheep dog
4. wallaby	d. an Indian cage bird
5. sora	e. a plant yielding a strong fiber
6. sorb	f. a small song bird
7. pippin	g. a plant of the cabbage tribe
8. pipit	h. the rowan tree or mountain ash
9. kelp	i. a valuable timber tree of northern Brazil
10. kelpie	j. a small North American rail
11. kala	k. a ground squirrel of Europe and Asia
12. kale	l. certain varieties of seaweed

Nature Park on the Delaware

By PAUL H. FLUCK

Photographs by Norman Fisher

Fatty, the tame flying squirrel, poses with an acorn.

IT WAS the day before Christmas. A group of ragged soldiers huddled around crackling pine logs on a high bank overlooking an ice-packed river. Tinkling like a string of tiny sleigh bells, a flight of juncoes flew in to feed where the snow had melted close to the fire. A white-throated sparrow hopped out of a rhododendron, and a chickadee pecked at the end of a stick that a soldier had used to roast a rabbit. Stamping through the snow an artilleryman came up with his arms full of brush and the birds flew away down the river.

"Lucky birds," the soldier said. "If I could fly I wouldn't wait to die on the banks of this river."

"Better keep your trap shut or Tom Paine'll hear ye," a whiskered sergeant warned.

"Tom's off to Philadelphia with General Mifflin. Anyhow, a man can't run off with rags on his feet."

"No, and it ain't likely you'll be wearing shoes until spring."

"Or never."

Both men laughed grimly. There was the sound of ice crashing on the rocky shore.

"Any news of the Captain?"

"Lieutenant Monroe says he's bad. Coughed all night and spit blood. Reckon he won't be going to Jersey tonight when we cross the river."

One hundred and seventy-five years pass. A group of bird watchers, stamping through the snow on a Christmas bird census, stop to train their binoculars on a male purple finch perched atop a brown stone close by the river bank. Frightened by a low-soaring buzzard the finch flies off, but the man from Brooklyn still watches.

"There's writing on that stone — something about a Captain Moore of a New York Artillery Regiment."

"It's a grave," a slim woman tells him. "This is where Washington's Army camped before they crossed the Delaware."

Nature and history meet on the banks of the historic Delaware at Washington Crossing Park, Pennsylvania. Less than an hour's drive from Philadelphia, less than three hours' drive from New York City, the Revolutionary campground on the banks of the Delaware has become a mecca for Nature enthusiasts as well as historians.

The great "butter pines" that sheltered Washington's ragged men have gone down the river in log rafts to build ships in the yards of Philadelphia. But the rhododendrons are still there. The hemlocks are still there. Juncoes and white-throated sparrows still scratch where their own ancestors scratched in melting snow around Continental campfires. Titmice and chickadees still dart from spruce groves to snatch morsels of suet, and in the shadows of forested Bowman's Hill, great horned owls still court on cold December evenings.

Actually, for the bird watcher, the wild flower enthusiast, and the Nature photographer, Washington Crossing Park holds more of natural interest today than it ever did in Continental times. There is a wild flower preserve — possibly the most complete collection of American flowering plants of the middle Atlantic States — numbering more than 1000 species. There is a well-equipped bird-banding station where native birds can be seen in the hands of experienced bird banders. There are tame birds, tame raccoons, tame woodchucks, and countless opportunities for the Nature and wildlife photographer. There are outdoor

Snooky is a blind sparrow and a favorite with such visitors as these two boys.

movies and lectures in the summer months, and full time naturalists to guide one at any season. Washington Crossing Park is conducted like a great National Park — like Yellowstone — but in miniature.

People come by the thousand to see the spring flowers and to spend an hour wandering along the easily marked trails along Pidcock Creek. They spend two hours; three hours; all day. They come back again and again. Going to Bowman's Hill becomes a habit. One busy insurance man came to the wildflower preserve to photograph a flower and since then has photographed more than 500. He comes every Friday from spring until the last gentian shrivels and dies, in late October.

Norman Fisher, a young, bespectacled Air Force veteran, is in charge of the wild flower preserve. War with Japan is over, but for Fisher the war against Japanese honeysuckle goes on forever. A graduate of Brown University, Mr. Fisher is an expert wildlife photographer as well as an able botanist. He is always willing to stop long enough to help with the composition or lighting of a flower closeup. As Fisher says; "Only the flowers that are photographed in color bloom forever."

A bird-banding station is maintained, and the author displays a male towhee that has been captured for banding.

The flower trails are named appropriately for the flowers they display and for the botantists who planted them. The Edgar Wherry Trail honors the great University of Pennsylvania botanist. It is one of the finest fern trails in America. Royal ferns, New York ferns, maiden-hair ferns — practically every fern native to Pennsylvania grows in a natural habitat.

There is a Medicinal Trail where herb remedies of witches and old time medicos grow. There is the ginseng plant with a root the shape of a man, a root that Chinese still believe restores the power of manhood. There is monkshood, and twin leaf, and cimicifuga. Last year a pair of Kentucky warblers built their nest at the base of a slippery elm.

On Gentian Trail, and Bluebell Trail, and Azalea Trail, and Marigold Trail a profusion of these specimens grow, rare varieties and common ones side by side. In the sphagnum bog grow several species of sundews, insectivorous plants just as truly as the pitcher plants that grow beside them. Rare bog orchids, Calapogons and Pogonias bloom in season because Botanist Fisher had what it took to find them in the cedar bog thickets. Lady slippers and showy orchis, arbutus and most local species of spring flower in your flower guide is sure to be there, if your eyes are quick enough to find it. Flowers can not be picked, of course, but they can be photographed.

At Washington Crossing Park there are two woods; the natural hemlock and deciduous forests, and the new woods — Penn's Woods. Strange as it sounds, Penn's Woods is not the oldest. It is an area of planted trees, each tree a memorial to someone who worked to make Washington Crossing Park a reality, and to men who gave their lives in World War II.

By far the majority of the thousands who flock to the park come as picnickers, lunch basket and thermos jug in hand. Under the tall trees beside Pidcock Creek they spread their lunch. Then tiny, squeaky voices high overhead — the voices of flying squirrels, or a superb, soaring, broadwinged hawk attract their attention. Next week they come again — this time with a bird book and a pair of binoculars. Each week they come earlier to hold their table, for the crowds increase. Just how much crowds increase can be shown best by statistics. In the month of April, 1952, there were 11,000 visitors, in the month of May, 1952, there were 19,000 visitors. And nobody knows how many pass uncounted. But the cerulean warblers high on the hemlock slopes do not care. Neither do the Louisiana water thrushes, whose babies learn the sound of human voices the day they leave their crowded egg-shell nurseries.

Botanist Fisher sleeps soundly but he has his nightmares. First he hears the sound of human voices, hundreds of human voices. Then he hears the tread of thousands of feet. Then in his nightmare the crowd stampedes — down Marigold Trail — up Bluebell Trail — into the sphagnum bog. Like a thundering herd he hears the crowds crash along Medicinal Trail, disappearing over the hill into the far woods, leaving a wake of battered stamens and pistils, corollas and sepals behind. But Fisher's nightmares have never materialized except in the form of one automobile out of control hurtling through the orchids in his precious sphagnum bog.

When the schedule for the bird walks was released last spring, Fisher shook his head sadly. Boy Scouts,

Girl Scouts, Garden Clubs and picnickers he had led over the trails by the thousand. But bird watchers! That was something else again. A bird is up high in a tulip tree. Two steps forward, glasses carefully raised, and, underfoot, down goes the one and only specimen of a rare *Habenaria*. Fisher was worried. He called a council of war; a war on bird watchers. A country doctor from New Jersey offered a solution. There was still one part of the park grown wild, unplanted, free from picnic groves and Fisher's priceless plants. It was there the bird walks would be held, from there and from the observation tower.

Fisher was relieved; in the succeeding weeks he gained weight, found himself becoming a bird watcher and enjoying it.

The bird walks this year were spectacular successes. On a single May morning more than eighty species of birds were seen in the Bowman's Hill section of Washington Crossing Park. Blackburnian, cerulean, and black-throated blue warblers flitted like butterflies around the heads of forty bird watchers at the base of the observation tower. A five-year-old boy was heard to remark to his mother, "I like the Blackburnian warblers best, mommy." For the bird watcher who is inclined to be skeptical about warblers — warblers can be *seen* as well as *heard* at the base of the great tower on Bowman's Hill.

Newest Nature wrinkle at Washington Crossing Park is a well-equipped bird banding station. A man might feed birds — he might know birds — and he might watch birds for years. He might read stories about bird banders and want to be a bander all his life. But he might never see a banded bird or have an opportunity to meet a bird bander. Consequently he might never have an opportunity to learn bird banding. There are less than 2000 active bird banders in the whole United States.

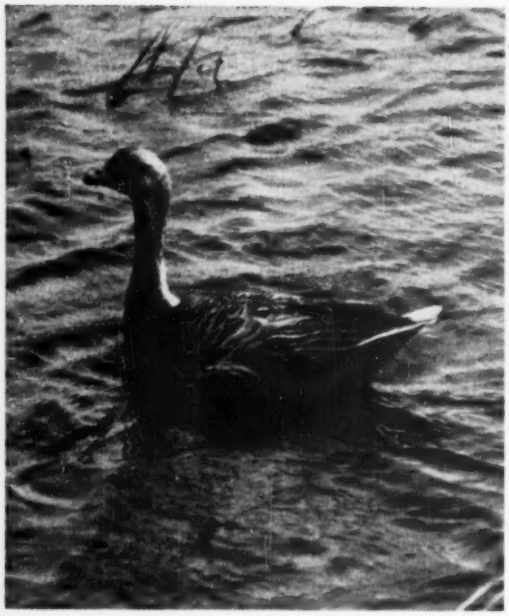
The observation tower, built where Washington watched the British, is visited by warblers in spring and fall.

Norman Fisher, botanist at the park, shows a visitor some of the hardy flowers along the Medicinal Trail.

It was to help the man or woman who seriously wants to learn bird banding that the bird banding station at Washington Crossing Park was opened. Large traps the size of a small room are baited with dripping water pails, mirrors, and every kind of bait imaginable. Into these come flocks of migrating birds and resident birds in the summer. Each one is carefully caught and banded and released to fly away — carrying the band forever. At least one of every twenty of those birds are expected to be trapped again — alive — there on the slope of the Delaware River.

Every bird lover is welcome to visit the station and to see birds banded. But only a very few can qualify to be bird banders themselves. Beginners at bird watching are advised to go out and to learn birds — then to return. Others, sufficiently well-versed in bird identification, come back week after week on Sunday mornings to learn the rudiments of the most fascinating Nature hobby of all. But the final decision as to who can be a bird bander, and who can not, rests with the Office of Bird Banding at the Patuxent Research Refuge in Laurel, Maryland. No one can band birds in the United States without a Federal banding permit issued by that office.

Every sport — every busi- (Continued on page 106)



The emperor goose is not regal either in its size or markings, its popular name having come about through misunderstanding of a Russian name for the bird. It has been suggested that guinea goose would be a more appropriate name.

The Emperors of Tanaga

By RALPH J. DONAHUE

U. S. Fish and Wildlife Service photographs

THE barren, storm-swept islands of the Aleutian chain seem about the last place one would look for a haven in which to spend the winter. There are, however, a number of northland birds that go no farther south than these islands when the Arctic gales set in, and the northern seas freeze over.

Among this number is a species of wild goose called the emperor. After a summer spent among the rock reefs and tide-flats of the shores of the Alaskan mainland, during which time the birds nest and raise their young, they fly southward. While most of these Arctic geese winter in the Aleutians, a few drift along the North American coast even to the northwestern limits of the United States.

The word emperor seems to imply a large and, if not beautifully plumaged creature, at least one with regal bearing. But, in truth, although its feathered coat is striking and, at close range, quite pleasing to look upon, the goose is no larger, nor more regal than the common black brant. Its length average is twenty-six inches, while that of the Canada goose, for instance, is thirty-eight inches.

Because the smoke-gray feathers of the back are edged with black, the emperor's plumage has been described as "scaled." Its head and tail are white, although the under side of the throat and lower mandible are black. Its feet and legs are orange-colored with the toenails of ebony.

Because so much of its food is from the sea, the edible qualities of the flesh of this species leave much to be desired. Not only does it have a disagreeable odor, but a most unpleasant, fishy taste. Nevertheless, as indicated in the bones found in considerable number in the long-buried kitchen-middens of the island's old-time inhabitants, the flesh of the emperor was one of their staple items of food.

A nest of the emperor goose containing young and eggs about to hatch.

How, then, does it develop that these small Arctic geese, with such unemperor-like attributes, should be given the name they bear? It began, so the Smithsonian informs us, with a misunderstanding of the Russian word *tsiesarke*, which means guinea hen. The American travelers of the early days thought the natives were saying *tsarakia*, the Russian word for imperial, hence the little goose is called emperor. Guinea goose would have been a more appropriate name; for, as suggested by Austin Clark, in the 1945 Smithsonian Report on the Aleutians, "this blue-gray goose, with its white head and neck, does suggest a huge, slow flapping guinea when on the wing."

In September, 1943, I had a seven-month military duty transfer from the island of Kodiak to the island of Tanaga, to westward of Adak. So I was able to see the first emperor geese of the season arrive. Late in October of that war-torn year, I saw a flock of about twenty of these birds come slanting down out of a brisk Bering Sea wind. They alighted near me on the rock-strewn beach of Tanaga Bay, and immediately began to poke among the ragged windrows of wave-rolled seaweed.

During the weeks that followed, the flock grew in size, through the addition of new arrivals, until one day I noticed it had broken into two groups. One of these groups, from then through the balance of the winter, confined itself to the coves and inlets of Lash Bay; the other to the area around Tanaga Bay on the opposite side of the island.

According to reports, the emperor geese, on their breed-

ing grounds, are a wary lot, never permitting an observer to get a close approach. I found it different on Tanaga. While the flocks would not let me actually walk among them, I found I could station myself near their feeding areas, while they were away, and have the geese return and alight almost at my feet. As long as I made no quick movement, apparently, I was no more to the birds than were the huge boulders of basalt that were numerous along the shore.

During the worst days of storm, through January, when Arctic williwaws slammed tons of kelp-filled water against the beach rocks, I could see, in the sheltered coves, the geese at their activities. At such times they seemed even more tame, almost as unafraid as barnyard fowl. Nor did they appear to notice the storms; resting, sleeping or eating as though nothing out of the ordinary was happening.

Through the following month of February and on into early March, I watched and studied the actions and habits of the emperor geese on Tanaga. Sometimes I would find the birds on the dry beaches at considerable distance from the water's edge. At such times they were much more on the alert to possible dangers around them. Often I would see bald eagles watching the flocks from lookout points on the high rock upthrusts. More than once I surprised a blue fox in a stealthy approach through the dead clumps of strand wheat or wild rye. Although I did see an eagle dining on a freshly killed goose, I do not know that the eagle had killed the bird. Some of the nimrods of my Seabee outfit could not resist shooting into the flocks of these little Arctic geese, and possibly the eagle's dinner might have been the result of such shooting.

By the end of March there were no more emperor geese to be seen that season on Tanaga. It is assumed that the survivors all had flown northward where, when the time was right, new families would be started, and new emperors be sent back, the following winter, to enliven the stormy shorelines of the islands of the great Aleutian arc.

A Winter Picture

By MARY EVANS

The seeming dull February day was drawing to a close. The rain had ceased, but a drizzle now and then made one aware of the chilly atmosphere. It was mild for mid-winter, although it was damp and the air was fresh with a hint of spring in its wake, which gave courage to one's thoughts. Even if snow, ice, or bitter cold should follow, spring would not be far away.

A light gray, almost white veil partly covered a sky rich in tones of blue, purple, rose and yellow. The rays from a hidden setting sun pierced the veil, casting streaks of gold across and through it, and upon the earth, where it lay in soft mellow lights.

It was hard to tell which gave the distinct hue of deep pink to the whole scene. Was it the reflection of the illuminated sky? Or was it the various shades of red-brown earth? The same hue seemed to be in the tall meadow grass, as the light breeze brushed it by, thus revealing the tones. The honeysuckle, as it scrambled up the dark green cedar, festooned the far banks, and crept away over the lowland unchecked, was a decided pink. Was it in the rich mahogany-colored oak leaves that persisted on the strong, rough almost black-barked branches lifted broadly towards the sky, or the red stems of the osiers, repeating the same rich red hue — a vivid contrast to the tall grass, as they stood in clumps along the stream?

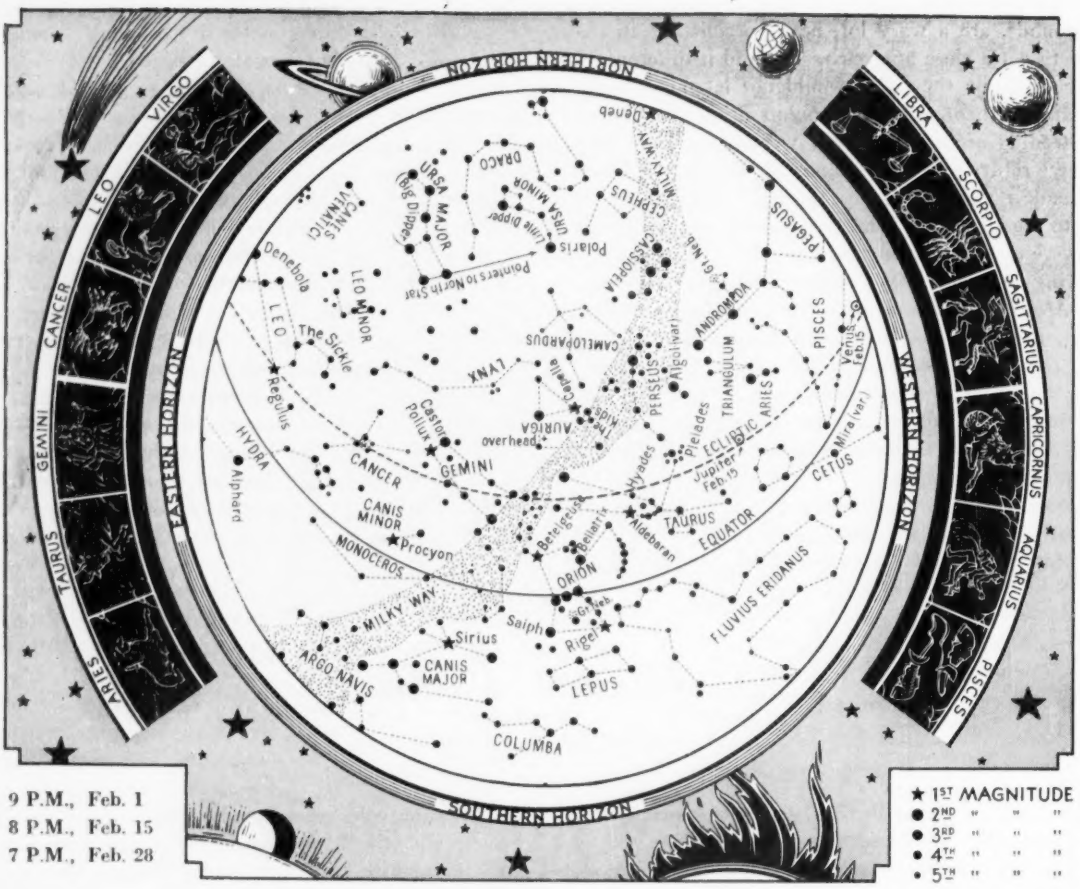
The burnished copper of the beech leaves against the gray branches was certainly a reflection from the golden rays of the sunset, while purple shadows softened their outlines, on the earth like dark pools of silence.

The same color was found on the carpet of fallen leaves, and the little rosettes of weeds and flowers grew in pinkish tufts, reminders of the year's story. Small patches of green here and there showed that, although all was quiet and so carefully protected, Nature was still at work — very much alive.

The meadow was low; the stream wide, shallow, flowing gently in its course through rich bottom soil in shades of brown, over the pebbles of gold and white, over the large stones of pinkish brown. It slipped along, murmuring, as it ran faster under the bridge, to narrow among the black rocks beyond until it disappeared in the thick woods, leaving in its wake the faint sound of music as from many tiny harps.

The wind changed, blowing away the drizzle and mist. A delicious odor of burning wood was floating on the freshening breeze, filling the meadow with a fragrance; and against the clearing sky deep blue smoke curled upward and outward creating a lighter blue haze. What a picture — what a perfect color scheme! How still it was; how peaceful! The red gold of the sunset left a glow in the deepening sky, proclaiming a fair day for tomorrow. A little bird chirped a note or two — then all was quiet. Then on the wings of the wind the sound of a bell, clear and full in silver tones told the passing hour, as it floated over the fields and far away.

The dullness of the day had given way to the beauty and fullness of a perfect winter evening. The last bit of gold vanished in the deepening blue sky; a single star sparkled.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Earth Viewed from Other Planets

By ISABEL M. LEWIS

IF WE could gaze at the night skies from other planet worlds in our solar system and search for our own Earth-Moon pair, how would it appear to us, and from what other planet could it best be seen? The Earth-Moon system is quite unique in that our satellite is so much larger, compared to the planet around which it revolves, than any other in our solar system. Earth and Moon appear more like a wide double-star system seen at distances of million of miles than as a planet with the usual comparatively small attendant satellites. So one way we would have of recognizing our own world against a background of stars would be to note whether there was, revolving around a principal star-like object, another one, about three magnitudes fainter. This would be our Moon. Under certain conditions this pair would attract immediate attention as an unusual system of outstanding splendor unlike any other that is to be seen in the heavens.

As one travels outward from our planet and its satellite, the curved surface of our globe begins to assume a flattened, disk-like appearance, as does the moon as seen without telescopic aid from the earth, at a distance of around 240,000 miles. Finally, at distances of some millions of miles, this disk-like appearance would disappear completely, to be replaced by the star-like appearance of small comparatively near planets, or large far distant ones, when seen from our own earth without aid of telescopes. Unlike the stars, however, the planets can be recognized by the fact that, with strong enough telescopic aid, they show appreciable disks, which the stars never show, becoming more like points of light the greater the power of the telescope. Also planets never twinkle but shine with a steady light.

Searching through interplanetary space for a favorably located planet, from which to observe our own world and its attendant moon, one may turn toward Venus, Mercury, or Mars. If one overlooks the fact that Venus has a dense, cloud-filled atmosphere one would undoubtedly pick out this planet.

Venus comes closer to us than any other planet and under the most favorable circumstances. We should seek out a time when Venus is at inferior conjunction with the sun as seen from the earth. This is the time when Venus comes closest to the earth. It is the time, also, when it passes between earth and sun from east to west of the sun, and cannot be seen from the earth except upon the rare occasions when it transits the sun instead of passing above or below the sun, as normally. Although at the time of inferior conjunction of Venus with the sun it is most poorly placed for observation *from our planet*, it is the most favorably placed of any planet for observation *of our planet*. The night side of Venus is then turned directly toward the Earth-Moon pair, which is in opposition to the sun as seen from Venus, and a distance of only 26,000,000 miles, approximately, from Venus. No other planet ever comes as close as this to the earth. Mars, when in opposition to the sun as seen from the earth, is in the same position relative to the earth as our planet is to Venus at this time, but Mars can never come closer to the earth than about 35,000,000 miles.

How, one may ask, does our Earth-Moon pair appear in the night sky of Venus under these circumstances, if skies are clear? The ever-changing position of the Moon with respect to the earth, as it revolves slowly around it, will be one of the interesting things to observe at this time. The dazzling brilliancy of our planet as seen from Venus under these circumstances is greater than that of the planet Venus itself as viewed from the earth at time of its greatest brilliancy. For the earth, several hundred miles greater than Venus in diameter, can be seen from Venus at a time when it is fully illuminated, while Venus, at the time of its greatest brilliancy, is in the crescent phase. Moreover, the earth is only 26,000,000 miles from Venus, at inferior conjunction, while Venus at its time of greatest brilliancy is about 65,000,000 miles from the earth. As a result, our planet seen from Venus is a far more brilliant object than is Venus seen by us at the time of its greatest brilliancy, while even our satellite at that time is a rival of Jupiter in splendor. No pair of such startling beauty and splendor is ever seen in our night skies.

On Mercury, as on Venus, the best time to observe our planet and its satellite would be at the time of inferior conjunction with the sun, when our earth would be in opposition to the sun and visible from the night side of the planet at a mean distance from Mercury of about 57,000,000 miles. Although less brilliant than when viewed from Venus in the corresponding position, our planet, with its satellite, would be a very brilliant and beautiful pair in the night sky at that time, rivaling in splendor Venus at her best as seen from the earth, with the revolving satellite comparing favorably with Sirius in brightness. If our planet and satellite could be viewed telescopically at opposition from Venus or Mercury, under favorable conditions of seeing, the surface features of our planet would be of fascinating interest, giving the observer as many puzzling problems to solve as we have in interpreting the nature of the surface markings on Mars when that planet is in opposition viewed from the earth.

There are, of course, times when our planet is most unfavorably placed, or invisible, from Venus, Mercury, or Mars, just as there are unfavorable positions of these planets seen from the earth. At time of superior conjunction of Venus or Mercury our planet is in line with the sun and invisible from either of these planets. And before or after superior conjunction it remains so near the sun, and relatively so far from the planet, that it is still poorly placed for observation. Mercury, as nearest planet to the sun, changes its position relative to the earth more rapidly than any other planet and more frequently gets into more favorable, and also more unfavorable positions, for observation of our planet and satellite. Mercury is usually both at inferior conjunction and at superior conjunction three times in a terrestrial year.

With respect to the planets *exterior* to it, the Earth-Moon pair never come into opposition with the sun. Its position relative to these planets — Mars, Jupiter, Saturn, Uranus, Neptune and Pluto — is the same as that of the two planets interior to the earth's orbit, Mercury and Venus, with respect to the earth. It is in inferior conjunction with the outer planet when it passes between the sun and that planet, and in superior conjunction when the sun (Continued on page 108)

Semper Ides

By FELICE de HORVATH

Back in the dark Reptilian age
When dinosaurs were all the rage,
The ginkgo was a ginkgo tree
Precisely like the ones we see
Upon our city streets.

While other creatures shed a wing
Or grew more legs or some such thing,
Until no father knew his son —
The ginkgo was not such a one.

(Apparently a resolution
To have no part in evolution
Was its philosophy.)

Milleniums have passed away;
The ginkgo's fan-shaped fern leaves sway
Just as when pterodactyls played
Beneath its green, primordial shade.

I think it's very nice to find
Something that hasn't changed its mind.

The School Page

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

PIONEERING

WHEN I was in far off New Zealand, a few years ago, I heard of a native Maori who had purchased a race horse of known ability and entered it into a race, only to have the animal die of heart failure in its first competition. When the Maori complained to the man from whom he had bought the horse he was told that it was strange that the horse had died because he had never done it before under similar circumstances.

A neighbor of mine has had the custom for years of buying a load of topsoil from a local farmer to enrich his garden. This year he noticed that the soil did not do much enriching. When he complained to the farmer he was told that he was sure everything was all right because he had been taking topsoil from the same place in that field for more than ten years, and that this was the first time he had had any complaint. He always took the soil from the top, so that made it topsoil, of course.

In our local veterinary college we often get news of city folk who take up farming with little practical experience, and who, in their difficulties, often come to the veterinarians with strange problems. A Manhattan resident had taken over a small farm, and, to give it proper atmosphere, had bought a cow. After a while the cow became most restive, mooing plaintively and generally registering great discomfort. When the veterinarian came he noticed that the cow evidently had not been milked and advised the owner that if the cow were milked his problem probably would be solved. He received the answer that they had delayed milking the cow until company came so that they could have really fresh milk in abundance.

The Maori, the topsoil salesman and the city owner of a country cow all found difficulties when faced with new situations. All had to do some pioneering, some exploring of new realms of human experience. None could understand why what had been could not continue to be in any new situation they might face. If you could save up money for a banquet in a city why could not the cow save up milk for guests who might come at any time in the future? If you had taken top soil successfully in one spot for years why could you not do this indefinitely? If you bought an old horse why could you not expect it to do forever what it had been doing in the past?

I wonder if some of our teachers are not like the Maori, the farmer, or the city man. High school teachers and writers of high school science texts often present their material as it was presented to them at college. Elementary school teachers and writers of elementary texts often seem to think that elementary school children have the same capacities, interests and abilities that they themselves have. Because they have been accustomed to get ideas quickly from a printed page, they think that little children should have equal skill. Some of these teachers overlook the possibility that the children may be able to use some uninhibited abilities in learning that have not been dulled by the disciplines of orthodox education. Such teachers may understand children no better than the city man understood his cow. They may think that the only rich topsoil comes from books, and that because one system has worked with them for years it will always work equally well with others. As a matter of fact the teaching profession offers its greatest rewards to those who are willing to try new ways, with new people, under new conditions, at different times. True there are proved ways of doing some things, but the real fun of teaching comes from what a poet student of mine once described adequately by saying:

"It may be I shall never see
A Chinese junk with purple sail
Drifting upon a quiet greenish sea
Drifting beneath a sunset cold and pale,
Yet shall I be content with only this
To take a little child by the hand
To go adventuring in that child's heart
Some day to understand."

The main speaker at a recent teachers' meeting in the South appropriately wandered all over the field of logic when he spoke on the subject "The Retreat from Reason." He described how his primitive man, "Glub-glub," got in wrong with the big shots by doing something different when he added a handle to his hand axe. He glorified the pioneering spirit of "Glub-glub," who had been responsible for making a change in the way of doing things. Then he retreated from reason and protested any change in the political philosophy to be followed in our country. In a wholly unreasonable manner he used the political record of one member of a political party to damn all other members of that party, forgetting that the opposition had been a party to the specific evils he had decried. He overlooked the fact that the status quo, which he defended, may be the unreasonable alternative to be faced. It is quite possible that in education, in government and in science sometimes the truly liberal, reasonable path is more conservative than that now being followed. If it is reasonable to be conservative at times, it may be unreasonable to continue to be ultraliberal in all matters. We can pioneer in more than one direction.

There was a time when pioneering meant exploring only new, unvisited territory. Now we are finding, in science, that the great pioneers are those who are going over old, familiar territory, finding there new opportunities not previously suspected. Madame Curie made her fame working over discarded ores. Maybe that was pioneering in reverse, but it was pioneering. We now make paper, steel and plastics from raw materials that a generation ago were rejected as useless. In wildlife work we recognize that the management of land may call for practices in drainage, plowing and harvest that are the reverse of those practiced by our grandparents. In the past few weeks I have driven through hundreds of miles of territory, which our agricultural engineers were draining a generation ago, only to find that they are now constructing hundreds of fish ponds to hold the water on the land.

There is no one way to make the most of a bit of land, a tree, a rabbit, or a child. The true pioneer will recognize in each some virgin territory worthy of exploration. The way will be neither wholly liberal nor wholly conservative. In spite of what "Glub-glub's" sponsor said it must be reasonable at all times. We must return to reason, not retreat from it, in education, government, industry and in other fields, and when we do we must recognize that it may be and probably will be reasonable to attack a problem in more than one way. This is what makes education as challenging to some of us as industry, economics and government may be to others. Except to the automaton teacher, there is no such thing as the child, the fish, the village, the bird. There is this bird, this child, this village and this fish, the problems of which may vary greatly from those of that bird, that village, that fish and that child. Education is essentially an individual thing. We may get some hunches about all birds, all villages, all fishes and all children from studying many of them, but we cannot afford to get away from recognizing not *the* individual but *this* individual, and the specific needs of this individual here and now. This approach is a challenge to the pioneering spirit of every teacher engaged in helping make the world a better place in which to live. It calls for real understandings based on knowledge. It cannot survive on shibboleths, on glibly remembered and glibly repeated generalizations. It calls for work, work like "Glub-glub" did when he improvised a handle for his primitive hand axe to help him do better work, with a better tool developed by application of reason, not retreat from reason. And since it calls for work, my friends, that is why education is a constant challenge to the pioneer spirit in us all. That is why its rewards are great. That is why you who are in education in its

truly liberal, rational, pioneering sense may expect rewards incomparable with those to be expected from the ordinary fields of human endeavor. That is why teaching is fun and satisfying. That is why I am glad I have been so long identified with it.

A young man recently recruited into the armed services was told, the first day, by his top sergeant that Chinese communists regularly took the hearts from newly killed American soldiers and ate them in the field. Because he asked the sergeant how many hearts a Chinese could eat in a day, when the sergeant had asked for questions, the recruit was punished publicly. Only one out of a hundred men had the intellectual courage to question the authority of a top sergeant in this situation. What percent of our teachers have the courage, the pioneering spirit to question, at the risk of their own discomfort, the intellectual quality of the educational status quo in which they find themselves? How many of us are pioneer "Glub-glubs" capable through the application of reason of developing a new hand axe with a handle, a new child capable of a more happy life?

THE MOOSE WHO LIKED PEOPLE

(Continued from page 72)

The Forestry Service, after considerable debate in high quarters, now decided that it was high time to take a firm hand with Svea. She had been brought over from Sweden, after all, to produce a strain of Danish moose and not to amuse the children of Helsinge. The bull moose were getting on in years and there was not much time. Svea accordingly was transported to a large game reserve in North Sealand where the bulls now ranged. For a while all seemed to be well. The rangers who were watching her reported that she did not seem to care for the bulls, that she was disdainful of them. But she was eating natural food contentedly and the rangers were sure that she would eventually "become wild," as they put it. Suddenly Svea disappeared. A hue and cry of several days brought no results.

A few mornings later Mr. Rosendahl saw the familiar face pressed against his shop window. Svea got her fresh bread, munched it, and went off on her accustomed round of visits. This time, however, the town council was firm. "Svea," said one of the councilors in the stormy session that day, "must be made to realize that she is an animal. She must not be permitted to disrupt with her whims the orderly government of our town." It was proposed that an offer of the Copenhagen zoo to take her be accepted. An enthusiastically carried amendment to the order stressed the word "temporarily."

Svea's arrival at the Randers Zoological Gardens was a performance in her grandest tradition. She was meek enough as she descended from her truck. For an hour or so she inspected the big enclosure which had been assigned to her, solemnly listened to her guards, sniffed and walked slowly around. Suddenly she gathered herself. A charge, a flying leap, and she had cleared the nine-foot moat into the park itself. Then Svea went for a walk. Citizens stared, zoo wardens tried to shoo her. She paid no attention. With regal dignity she looked at parked automobiles, sniffed at people, nuzzled children, and finally discovered a pond — in which she took a leisurely bath. Evidently satisfied with her new home, she returned to the moat, negotiated it effortlessly with another prodigious leap, and happily settled down.

A few weeks ago Svea died. All Denmark mourned. Pneumonia, the most dangerous enemy of the elk family, had seized her and even the newest medicines were powerless. A few days after her death my managing editor and I talked about moose once more. "Shall we try to find another one," he asked. "Another Svea," I said. "That would be impossible." "Then write an obituary, will you, that does her justice," he said.

Long Island Trees

"The Trees of Long Island" is the title of an attractive and useful, 64-page booklet published by the Long Island Horticultural Society, 10 Westminister St., Massapequa, New York. It is the work of George H. Peters, chairman of the Society's Big Tree Census Committee, and is the society's first major publication. There are 22 half-tone illustrations and the price is one dollar.

L. I. Naturalist

Volume One, Number One of *The Long Island Naturalist* comes to hand. It is the first appearance of the official publication of The Baldwin Bird Club, and will appear in the spring and autumn. We note with interest that one of the contributors to this first issue is Nellie D. Teale, whose husband is Edwin Way Teale, who, in turn, proves to be the editor. The club has been in existence for fifteen years and its membership is drawn from many Long Island communities. Subscription is fifty cents a year, and Mrs. James M. Sector, 19 Parkwood Court, Rockville Center, L.I., New York, is circulation manager.

Trees at School

The latest in the excellent series of forest conservation booklets, using the "comic book" technique, issued by the Southern Kraft Division, International Paper Company, Mobile, Alabama, is entitled "The Little Trees that Went to School." It is a picture story of a school tree planting program. Accompanying this booklet is another containing suggestions for teachers in putting over such projects.

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Camera Trails

By
EDNA HOFFMAN EVANS

NATURE photography is a hobby that can be indulged in and enjoyed by people of all ages. Actually, however, I think that many more older people enjoy it, even though it does seem like an ideal activity for the younger fry.

I can think of several good reasons, however, why there are fewer young people in the field. The requirements of photography are rather exacting for the active teen-ager; it takes time to make a good picture. So, while the boy or girl may like to get outdoors and observe the wild creatures, he or she may not want to go through all the tedious rigamarole that is necessary for picture taking. The financial angle, too, is important. Not many young people (or their parents) can afford very much in the way of photographic equipment.

Being quite well aware of the above mentioned facts, I am always particularly interested to learn of young people who like Nature photography in any of its phases. For that reason I pricked up my ears, both figuratively and literally, when I heard about 12-year-old Bill Stroup of Phoenix, Arizona.

Bill Stroup has been taking pictures for about a year. He takes good pictures and — please note this — he does so with a minimum of equipment, all of it inexpensive. What one boy can do, other boys and girls can do also.

Already Bill has a collection of salon-type prints that many adult photographers could envy. They include pictures of birds, of toad songsters whose throat pouches are a-swell with melody, of insects, of pets of various kinds. Two of his prints won prizes in the recent "pets are fun" contest sponsored by the photo lamp division of Sylvania Electric Products, Inc.

Bill uses a Kodak Duaflex II camera that takes 2¼ x 2¼-inch pictures. This is a twin-lens camera with a close-up focusing range usually listed at 3½ feet. Bill has found that he can focus sharply as close as 23 inches. Then, by using an inexpensive auxiliary lens, he can shorten the close-up distance to 8½ inches.

Both the above focusing distances were worked out by experiment. Once he had determined them, Bill rigged up a couple of time-saving devices that do away with any hit-or-miss focusing. For the greater focusing distance Bill has a 23-inch string. He drops the free end, with a small weight attached, close to the subject. The other end is attached to his camera, and when the string is taut his subject is in focus.

Bill Stroup, his camera, and a couple of his subjects. The print in the upper left is an enlargement of Bill's shot of a Gambel quail. Bill's photographer father, Forrest L. Stroup, took this picture of his son.

Then all he has to do is center the subject in the reflex-type view finder and he is ready to shoot.

For close-up pictures he has another device. His Dad helped him with this. They made it from a wire coat hanger. The two ends of the wire are just 8½ inches from the camera and are about six inches distant from each other. The wires slope smoothly back to the camera, where a loop fits snugly around the lens and is held in place by the auxiliary lens, which goes on over the loop. For additional anchorage, a two-inch section of what was originally the hang-up part of the coat hanger slides into a slot on the camera's flash attachment.

In taking close-up pictures Bill needs only to center the object between the two wires and release the shutter. He does not need to use the groundglass viewer at all — a good thing, since the auxiliary lens on the picture-taking member of the twin lenses upsets the focusing, anyway. Working at close range, Bill can even do the double job of holding his subject in one hand and operating the camera with the other. There is one difficulty, though. Bill is left-handed and the shutter release button is on the right side of his camera.

The depth of field in these close-up pictures is only about an inch and a half, since the camera's smallest lens stop is f:16. (Its other stops are f:11 and f:8.) However, with care, Bill can take close-up shots that are sharply in focus.

In addition to the flash gun on his camera, Bill also has an extension lighting system that makes for greater versatility. This was concocted from the base of a used flash bulb, a length of cord from his mother's iron, and a small hand-held reflector. Plugged into the flash gun socket, it is ready for business.

Bill uses verichrome film, and by buying out-dated film he can save nickels and dimes. All in all, his equipment does not represent an investment of more than $25, yet he takes pictures that many Leica operators can look at with envy.

Does Bill plan to be a photographer when he grows up? Well, he is not sure about that. But photography is a good hobby, anyway. The trouble is, none of his pals in the seventh grade share his photographic interests. A hobby is more fun when there is somebody to share it with. For that reason Bill's interests are

Four young finches in a finger. Bill Stroup took this picture with his Kodak Duaflex camera.

not centered solely in cameras. He likes to build model airplanes, too, and the birds he entered in the poultry division of the 1952 Arizona State Fair won four first, two second, and one third prize ribbons. His mother wishes he would spend more time practicing on his French horn.

Of course, it helps a fellow when Mother and Dad are interested in things, too. Bill's parents are. So is his younger brother, Mike, whose energies at the moment are focused chiefly on collecting and mounting butterflies, moths, and dragon flies. Like most understanding mothers of small boys, Mrs. Stroup is not particularly disturbed when bottles of bugs and other "crawly" treasures turn up all over her house. Nor does she object when Bill's pet mynah bird makes avian comments as he watches from his cage in the kitchen while she cooks supper.

Bill's father, Forrest L. Stroup, is staff photographer on a Phoenix newspaper, a fact that may explain some of his son's interest in photography.

The senior Stroup is also a Nature photography enthusiast and a breeder of birds — parakeets, finches, canaries, as well as rarer and more colorful birds from far-away regions. Bill can find plenty of interesting camera subjects without ever going out of his own back yard.

Forrest Stroup is something of an inventor, too, and he has concocted a new type of developer that one day, I think, may become a "must" for Nature photographers, as well as for all cameramen who want particularly fine grain development for their negatives.

"Muralmatic" is the name Stroup has given his developer, a most appropriate appellation for by means of it film will give photomural-sized prints with a fineness of detail that is almost unbelievable.

Stroup has worked out a table of development times for the various speeds of cut film, roll film, and film packs. He recommends agitation during development, either continuous or at ten equal intervals. The developer should be used at full strength and should be returned to the storage bottle after use. Its active lifetime, he says, is much longer than that of most other developers.

Certainly, from the results obtained in enlarging both his and his son's negatives, Stroup's developer preserves details that are soon lost when negatives not developed in Muralmatic are blown up.

That is one youthful photographer and his family. I was glad to hear a report of progress recently from another young Camera Trailsman — Walter Olekseshak of Mars, Pennsylvania. His first letter, several years ago, asked for advice about camera equipment. Now he writes:

"Since having last written you about my problems, I have come a long way. I now own an Argus 21 and all kinds of equipment. I've been having the time of my life with this outfit. What an enjoyable hobby! Now I can see why you like it so much.

"About a year ago I photographed a display in Sears, Roebuck, and Co., in Pittsburgh that caught my eye. It was one of those Christmas displays that had Santa's helpers working in a toy shop. After having a print made, I took it to the store to show a friend of mine who had helped me with the lighting. While I was there the display manager walked up and noticed the print. To make a long story short, I was busy that month photographing the Christmas displays in their windows. How lucky can you get?"

It takes a lot more than luck, Walter. The element of luck does enter in, but

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there is also a lot of skill and hard work involved in the making of good pictures.

So, be they in Arizona, or Pennsylvania, in Maine, Oregon, Kansas, or Louisiana — here's to the kids and their cameras!

MUSEUM PICTORIALS

Since there is not enough space left in this section to permit mention of the various new pieces of equipment announced by their manufacturers, I am going to devote the rest of the Trail to a specific series of publications.

The Denver Museum of Natural History has sent me sample copies of the museum pictorial series, and after studying the publications I recommend them, singly or completely. The titles indicate subject matter as follows: "Nature Photography With Miniature Cameras," "The Story of Pueblo Pottery," "Stepping Stones Across the Pacific," "Fossil Mammals," "Nature Photography with the High-Speed Flash," "Laysan and Black-Footed Albatrosses," "The Hawaiian Seal," and (in preparation) "Some Common Wild Flowers of Colorado."

According to the subscription blank, each number of the series will be devoted to a single subject, and the series will eventually cover the activities of staff members in all departments of the museum. There will be accounts of expeditions, museum techniques and displays, life history studies of various forms of animal life, and articles based upon the exhibition halls of the museum.

There will be no set date of publication, but approximately four numbers will be issued annually. Of the numbers already issued, the eight are available as a complete series at a subscription price of $3.00, postpaid, while the future publications, numbers 9 through 12, may be obtained for an additional $1.50. The remittance should be addressed to Publications Department, Denver Museum of Natural History, City Park, Denver 6, Colorado.

THE PARK THAT MADE A PRESIDENT

(Continued from page 69)

are accompanied by the din of croakings and whoopings. Heads high, and long legs stiff, their wings hang down or flap wildly. At the climax of these cavortings, one or more of the birds may pick up a stick and throw it into the air.

During about ten days, each spring and fall, several thousands of these cranes pass over the park, or stop for mating or resting. In bands of a hundred or so, they trumpet hoarsely as they wing to and from their nesting grounds in the Canadian prairie provinces and the western Arctic.

Because of the variety of habitats in the park, the resident birds range from waterfowl and kingfishers to hawks, owls and many typical grassland species. Among the most conspicuous summer residents are killdeer, hawks (marsh, sharp-shinned, Swainson and sparrow hawks and prairie falcon); Sennett's nighthawks; kingbirds; horned larks; western meadowlarks; chestnut-collared and McCown's longspurs; rock wren, mountain bluebird and lazuli bunting. There are many sparrows, of at least seven species. Cliff swallows nest in the Badlands. Since sharptail grouse are numerous, anyone who walks or rides the trail may startle a covey into explosive flight.

Turkey vultures, orioles, several woodpeckers, flickers, meadowlarks and dickcissels also are here. The visitor may be fortunate enough to see a golden eagle soaring overhead.

So far as fishing is concerned, the Little Missouri does not support the so-called game fish. Channel catfish and common suckers, however, may grow to considerable size. Carp have found their way here, and eleven other fish species — mostly chubs and minnows — have been recorded.

Naturalists and little boys will be interested in the snakes — bull, western hognosed, plains garter and red-sided garter snakes. Prairie rattlesnakes are common, but seldom seen because they keep out of man's way if possible. Other cold-blooded animals found in the park are two toads, leopard frog, swamp tree frog, horned toad (more correctly, horned lizard) and the Northwestern tiger salamander.

A botanically-minded visitor wonders if there is a large variety of plants and flowers. There are two biotic zones — Upper Sonoran and Transition.

From the south, one's impression of the uplands is that they are largely treeless. However, the north sides of many buttes are covered with the horizontal juniper. The bottoms of draws, and lower slopes, here and there, are dense, tangled thickets of scrub oak, Rocky Mountain red cedar, green ash, buffaloberry and wild plum. Silver sage is a common low shrub on flats and hillsides. This is one of four sages that have been identified in the park. Rabbit brush is abundant in the drier places. Grasses occupy most of the area, of course; at least four native species have been listed.

Along the Little Missouri, especially on the broad river-bottom of the North Area, are stands of tall cottonwoods. They make a beautiful display of gleaming gold in autumn. The plants of this damper habitat include buffaloberry, dwarf sage, rose, virgin's bower and scurf pea. Lupines — rose, purple, and paler shades to nearly white — are showy in summer.

Extremes of heat and cold, ranging from 110 above to 49 below zero, have been recorded in Roosevelt National Memorial Park. Storms and snows that block roads and later arouse the Little Missouri to raging torrents are awesome. The most comfortable months for visiting this park are June, early July, September and October.

The park headquarters are located in Peaceful Valley of the South Area. A ranger is stationed near the east boundary of the North Area. At these two points, information can be secured about roads, campgrounds, and the special lectures, caravan trips and hikes scheduled by the park historian.

Peaceful Valley headquarters is six miles from Medora on the main line of the Northern Pacific Railroad and Highway No. 10. The park is one hundred fifty miles from the transcontinental air fields at Bismarck, North Dakota, and Miles City, Montana. The postoffice address of the park superintendent is Medora, North Dakota.

Roosevelt National Memorial Park has been set aside, not only to perpetuate the illustrious name of a great President, but as an example of the principles for which he stood. Ahead of his time, he voiced the ideals that were later to be adopted by the national parks. Instead of exploiting areas for their commercial value (stock grazing in this particular case), he advocated other values, far more enduring. Scenic beauty, wildlife, a vast laboratory for research and education, numerous forms of recreation.

Without protection, the most interesting fossils eventually would have been destroyed or carried away by collectors, tourists and curio seekers. Destructive and excessive grazing by domestic stock in time would alter even the earth's surface and contour. The restored and preserved area will some day be a unique and an object lesson to land managers.

One of Theodore Roosevelt's favorite maxims is particularly perpetuated by the national parks:

"*Leave Nature alone; Man can only mar it!*"

NATURE PARK ON THE DELAWARE

(Continued from page 97)

ness — every hobby — has its "gremlins," even bird banding. Bird traps are baited for birds — with apples, sunflower seeds, roasted yams, suet, doughnuts, and other savory morsels. But 90% of the bait is eaten by gremlins — gremlins who come at night to feast. But at Washington Crossing Park the gremlins arrive in the broad daylight, too. They have big bushy tails with black rings around them. They wash everything they eat in the water pans. They dump the bird feeders and twist the doors of the traps.

A "22" and a sharp eye would have made short work of the gremlins. But that is not how the bird banders and the Park Commission want it. Just as many park visitors are interested in "gremlins" as in birds. Park visitors under ten are definitely *more* interested. So the gremlins are invited to return. Bananas and juicy grapes tempt them. Sooner or later

almost every visitor to the bird banding station has a chance to see a big soft-eyed raccoon swinging by his toes from the overhead support pole in a bird trap. How else can you get so close to them?

Well, the doors on the traps are made to trap birds but they keep raccoons in as well. Then — when everybody has shot his last film the door swings open and Mr. Coon goes home with his banana. If the raccoons do not show up woodchucks do, and so do opossums, gray squirrels, and even those racers-through-the-tree-tops — flying squirrels.

Yellowstone National Park has bears, moose, elk, mule deer and Old Faithful. Washington Crossing Park has white-tailed deer, raccoons, woodchucks, and squirrels. Yellowstone Park consists of 2,200,000 acres and plays host to a million visitors every year. Washington Crossing Park consists of only 500 acres and plays host to 100,000 picnickers and nature lovers every year. Yellowstone is worth seeing — worth dipping into your life savings to see — worth traveling 2500 miles to enjoy. Yellowstone National Park as a nature thrill is second only to Africa's Kruger National Park. But you can not see either Kruger Park or Yellowstone on a weekend. Washington Crossing Park is different. You can pack your lunch basket and fill your thermos with coffee and drive there in a matter of a few hours from almost any place north of the Potomac on the eastern seaboard *any day of the year*.

If the Continental Army marched once more, the men with rags on their feet whose footprints left a trail of blood in the snow would be puzzled by the monuments. They would shudder as automobiles passed. They would strain their eyes after airplanes roaring overhead. But back in the woods at Washington Crossing Park their frost-bitten ears would warm to a wintery tinkle of juncoes and white-throated sparrows — still there — under the hemlocks at Washington Crossing.

"Professor" Baldwin

Dr. S. Glidden Baldwin is an eye, ear, nose and throat specialist in Danville, Illinois. He is also an enthusiastic student of Nature. So when the adult education program of the Danville schools wished to include a course in Nature Appreciation "Doc" offered to teach it. He quickly found himself with 32 students, indicating the interest in such courses that can be found in any community.

Tree Farms

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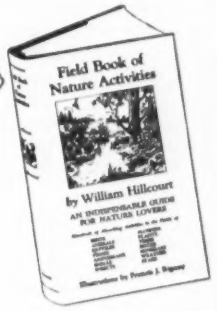

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THE FOREST LAND "STEAL"

(Continued from page 92)

bills drawn up by various members of Congress.

One such bill proposes to "divorce" the mineral rights from the surface rights in all mining claims. In other words, do not give the filer of a mining claim all the timber, water and other surface values, as well as all the minerals beneath the surface. Proponents of this bill believe it will stop the phony "miner" dead in his tracks. Perhaps it will.

Another remedial measure is in the form of a bill to list gravel, sand, pumice, building stone and cinders as non-minerals, and therefore not subject to the "discovery" proviso of the existing mining laws. At present, such materials are regarded as minerals and thousands of mining claims are filed upon land containing them.

There are also other bills and suggestions, all of them aimed at curbing the ever-spreading evils of abuses of the Federal mining laws.

At all events, something must be done. Not only is it undemocratic that the property of the nation be turned over to the hands of the few, but our very system of administration of natural resources cannot afford to be under the control of persons whose actions prove them utterly unworthy of the task of administering such resources.

THE KESTREL

(Continued from page 76)

this little hawk the "windhover" and I have heard the name "mouschawk" used, too. The latter is very appropriate because the kestrel destroys great numbers of small rodents. No doubt it takes young pheasants and partridges during the short period when these are small enough to be handled, but mice and rats are present all the time, from January to December. The kestrel has to contend with many difficulties, but remains an insouciant gallant little bird with the verve, tenacity and courage we have always associated with the falcons.

Readers familiar with southern England may be interested to know that although most of my notes were made in Sussex, the photographs were taken close to John Evelyn's old home in Surrey. Many of the great trees that surrounded me may have been known to him, and some may even have been planted by the famous diarist.

Dr. Halverson

Dr. Harold Martin Halverson of Yankton, South Dakota, was the first man in that State to band birds for the Government. His bird banding serial number was low — 320. A veterinarian, he was constantly in demand as a leader for Nature hikes, working with the Boy Scouts and other youth groups. Each year he conducted a bird census for the county. Born in Oslo, Norway, his parents brought him to the United States in 1881 when they went to homestead in western South Dakota. He was almost self-educated, but so well so that he had no difficulty in qualifying for the Chicago College of Veterinary Medicine, from which he was graduated in 1907. Dr. Halverson was a member of the American Nature Association until his death, and one of his daughters, Mrs. Lawrence P. Juell of Glasgow, Montana, writes us that her father treasured every copy of *Nature Magazine*.

Hawk Mountain

Continued steady increase in the number of visitors, with proportionate demand upon the staff and facilities, is reported in the annual report of the Hawk Moutain Sanctuary Association, 767 Lexington Ave., New York 21, N.Y. This outstanding conservation activity continues to demonstrate its great worth, and many school classes and Boy and Girl Scout groups have visited the mountain top. A group of young men in a nearby mining town have organized the "Hawk Mountaineers" and contributed valuable assistance in doing heavy labor on the sanctuary. The greatest need at the moment is erection of a building that will provide an assembly room, housing for the curator's assistant, an office, and a small library. A building fund has reached $17,000, which is not sufficient to provide the entire building, but necessity demands a start, which will be launched immediately.

EARTH VIEWED FROM OTHER PLANETS

(Continued from page 101)

passes between that planet and the earth. In both cases it is invisible from the outer planet. It also exhibits the same phases seen from an outer planet as Mercury and Venus do relative to the earth. It has greatest eastern and western elongations when it is respectively farthest east or west of the sun in angular distance, as seen from the outer planet. This angular distance finally becomes so small, and also so faintly luminous does our planet become because of its relatively small size and great distance from the planet, that even with the most powerful telescopes it could not be observed, or its existence suspected at the distance of Neptune or Pluto.

As viewed from favorable positions on the planet Mars our planet, with its satellite, would be more interesting to observe in the evening or morning twilight than is Venus seen from the earth. As is the case with Venus, the greatest brilliancy would occur when the planet is in the crescent phase, between greatest elongation and inferior conjunction, and when the luminous part of the crescent, increasing in area as it draws nearer the observer, reaches a maximum. As the earth will not be as near Mars in this position as Venus is to the earth in the corresponding position, our planet can never shine as brilliantly, seen from Mars, as Venus does at its greatest brilliancy seen from our planet, although the two planets are nearly twins in size. At the times when the earth is at its greatest angular distance from the sun, seen from Mars, it has only half of its illuminated side turned toward that planet. Its distance to east or west of the sun at that time is nearly as great as that of Venus, seen from the earth, at its greatest eastern or western elongation. A telescopic observer of the Earth-Moon pair would be much handicapped in his observations of our planet from Mars by the fact that it cannot be seen to any advantage except when its phase is that of a half moon or crescent. Our observations of Mars on the contrary can be made under most favorable conditions when the planet is nearest the earth and with its surface fully illuminated by the sun. At this time our planet, at inferior conjunction with the sun, is invisible from Mars. At the distance of Jupiter the angular distance of the earth from the sun is not much more than ten degrees. Most of the time it is too close to the sun to be seen at all. Conditions get steadily worse as one goes outward toward the other major planets. The earth's orbit lies too close to the sun, and it is too small a body to be seen under such unfavorable circumstances even telescopically. Long before the planet Pluto is reached our planet has disappeared from view.

A partial eclipse of the sun occurs on February 13, E.S.T., in which 76 hundredths of the sun's diameter will be covered at time of maximum eclipse at a point in Siberia. This eclipse will be visible in Alaska, eastern Asia, and the western Pacific from the 10th parallel of latitude north.

Mercury will be in superior conjunction with the sun on February 2, and toward the end of February will be in the western evening sky, well placed for observation as it nears eastern elongation. Venus is increasing in brightness and in fine position for observation high in the western evening sky at sunset. Mars is now in Pisces, visible in the western sky at sunset. Jupiter is near the meridian at sunset on February 1, and will remain high in the western evening sky in February, in Aries. Saturn now rises before midnight in the southeast in Virgo, northeast of Spica.

ANSWERS TO QUIZ

Answers: 1 - e; 2 - k; 3 - i; 4 - a; 5 - j; 6 - h; 7 - b; 8 - f; 9 - l; 10 - c; 11 - d; 12 - g.

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UNDER THE MICROSCOPE

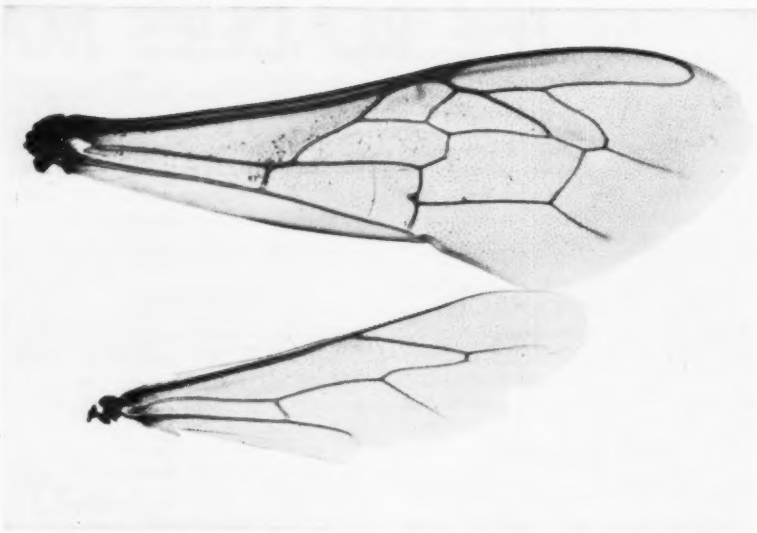
By JULIAN D. CORRINGTON

BIOMETRY

CAN YOU put a yardstick on living matter, as is done when materials are studied in physics and chemistry? Not long ago it was commonly held that life was a thing apart, its phenomena due to some property different from that of other matter, a *vis essentialis* or life force, that could not be weighed or measured. With the revival of investigation, during and after the renaissance of science in the Sixteenth Century, physiologists began to destroy this myth, and became sceptical of the existence of such things as "vital spirits" and afflictions of the "humors" of the body.

Harvey measured the volume of blood and rate of flow in the body as part of his proof that the blood circulated; Sanctorius took the temperature and pulse; Hales determined blood pressure and extended his investigations to sap pressure in plants; Lavoisier found that respiration was a form of combustion; Spallanzani swallowed a sponge tied to a string, and brought up some of his own gastric juice so as to experiment with it in glass vessels, outside the body. A great many further studies of this sort went a long way toward proving that Descartes was right in his earlier essay *On Man*, 1662, in which he dealt with the human body as a machine and inaugurated the mechanistic philosophy that holds that the plant or animal body contains nothing not found also in the inorganic world, and denies any metaphysical or spiritual property, as claimed by the opposing camp of vitalists.

Modern physiology and medicine have long been experimental, as is well known, and all advances in our knowledge of these subjects have been material and mechanistic. What of other fields in the life sciences? Every student of biology is familiar with the story of the Austrian monk, Gregor Mendel, who applied simple quantitative expressions and probability to the results of cross-breeding experiments and thereby discovered the laws of heredity. Modern embryology is experimental, and ecology, or the study of the relation of organisms to their environment, is almost entirely an application of the materials and methods of physics and chemistry to plants and animals. Indeed, biology has become an experimental science to a far greater degree than is known by most people, particularly by the chemists and physicists themselves.

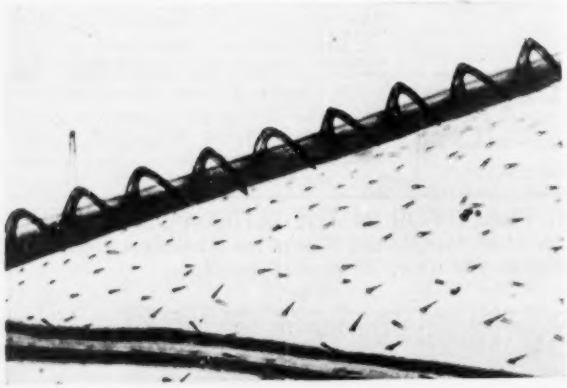


Wings of worker honeybee; 22 hamuli on rear wing, trough on forewing.

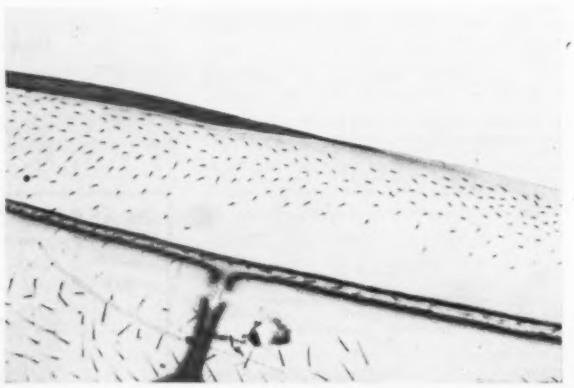
Among less familiar divisions in which the approach to life studies is mathematical is the biometrical (life-measure), and it is interesting, although not wholly surprising, to note that biometry was introduced by an astronomer, and thus by a mathematician rather than a biologist. Lambert Quetelet (1796-1874), in Belgium, began inquiries in 1835 as to what constituted an "average man," and found that he could deal with both physical and psychological variations according to the law of probability. In 1848 he published *On the Social System and the Laws which govern it*, the foundation treatise in vital statistics.

Application of these principles to human heredity was made by Sir Francis Galton (1822-1911), cousin of Charles Darwin, whose brilliant accomplishments embraced such diverse fields as meteorology, criminology, anthropology, and genetics. He founded the fingerprint system of personal indentification (this Department, April, 1939), made the first composite photographs, and established the science of eugenics. Galton attempted to apply statistical methods to every sort of human difference and, with Karl Pearson, (1857-1936) brought out the *principle of correlation* between two sets of data, such as *growth* with *age*. Pearson founded the journal *Biometrika* and greatly advanced the statistical approach to genetics, physiology, anthropology, and other biological sciences, and influenced non-biological studies as well.

Regarded today as a mathematical science in its own right, *statistics* is defined as the "collection and classification of facts on the basis of relative number or occurrence as a ground for induction;



Hamuli under high power.



Beginning of trough.

systematic compilation of instances for the inference of general truths" (Webster's Dictionary), this being the best concise definition we have read. *Biometry* is familiar in the guise of insurance or actuarial figures on one's chances of living to be 75, the average height of male American college freshman, the I. Q's. of Negro children in the fifth grade, and numberless other determinations of like import. It is less familiar in the form of growth studies of brook trout, incidences of infestation of cat mange mites, or effects of drugs on various forms of muscular tissue, and is still less familiar when presented in some research seeming to have little or no bearing upon human interests, as in the case selected for treatment as our chief example. Today, by definition, the large group of investigations on organic subjects by the quantitative methods of physics and chemistry which do not involve the attributes of populations, as opposed to individuals, or require statistical treatment for their interpretation, are ruled out. Biometry may be defined tersely as the mathematical study of the properties of populations, and those with which we shall deal in our specimen case are honeybee populations.

Insects typically have two pairs of wings, sometimes both alike, as in bees, sometimes unlike as in grasshoppers. If similar, they can both function in flight, and there are numerous instances of devices to join the two wings of a side together so that they may act in concert and, presumably, more effectively than if not united. Among such adaptations, one of the most intricate and ingenious is that of a series of hooks on the front margin of the rear wing, which the owner can fasten or unfasten at will into a trough, or stiffened fold, of the rear margin of the front wing. The honey bee, *Apis mellifera*, known and used by man for more than four thousand years, possesses these hooks or *hamuli* and, like all other structures of this, the most economically important of all insects, they have been studied intensively. By selection and breeding, man wishes to perfect the best bee, and so inspects everything about the animal to this end.

All three castes of bees have these hamuli — queens, drones, and workers. In a thriving bee state in the autumn there will be one or two queens (functional females), a dozen drones (males), and some fifty thousand workers, which are sexually undeveloped females. These workers present exceptionally favorable material for the study of variation, since they are all the offspring of the same two parents. The queen takes a single nuptial flight and is fertilized by only one drone. Sperms are stored in a spermatheca and released by the queen at will; fertilized eggs develop into workers, unfertilized eggs into drones. Queens are made from worker larvae by changing the diet and enlarging the cell in the comb. Thus all the workers of a single state (the hive; incorrectly called "colony" by some) are actually sisters.

It is found that the number of hamuli on the wings varies within rather wide limits, and the question can properly be asked, how is it that bees from the same parents can inherit different numbers of hamuli? The beekeeper might wish to know how many hooks were present on the wings of the "best" bees, economically speaking. The ecologist would be interested in knowing if it made any difference to a bee how many wing hooks she had? Let us see how the biometrician goes about answering these and other questions raised by the fact of variation in hamulus number.

The individual microscopist can undertake this investigation with profit and interest; all he will require will be the time and patience to count a large number of specimens. As in any statistical study, the greater the number of observations, the more accurate the results and more significant the conclusions, consequently this work is ideally suited for class or club. It can be undertaken by a biology class of any age, from grammar school to college, and will make a fine project for a microscope club.

The first requirement is to obtain the bees. This is best done locally by those living in the country or small town. If you do not know of any apiaries, the grange or county agent will advise. For city dwellers, including teachers and club leaders, there is the entomologist(s) of any local university, the state university, state entomologist, dealers in beekeeper's supplies, or biological supply house. It is essential, however, to specify carefully just what is wanted. We still recall vividly sending away for specimens for this work and receiving a swarm of bees from a dealer — ALIVE! It is not necessary to interfere in any way with a functioning hive to obtain material; dead bees occur in profusion around and beneath the hive, especially in fall, and may be picked up and either kept dry or immersed in any available preserving fluid, as 80% alcohol. But it is important not to mix bees from separate hives, nor should drones be included with workers. The drones are larger and stouter and have no sting; pictures showing how to tell the castes apart are given in many zoology and entomology texts and manuals.

A dry or preserved bee is placed on a blank microscope slide, or directly on the stage of the microscope in the case of a widefield binocular instrument. The wings are then studied, using the lowest power of the equipment available, and cutting down the light so as to get a good relief picture of the row of hooks, seen at about the middle of the front margin of the hind wing. Note the trough of the front wing into which the hooks fit. Careful focusing is necessary to find out exactly which way the hooks curve and how they arise from the wing margin.

For counting, decide on using either the right or the left side; let us say, count only left wings. Start at the outer edge

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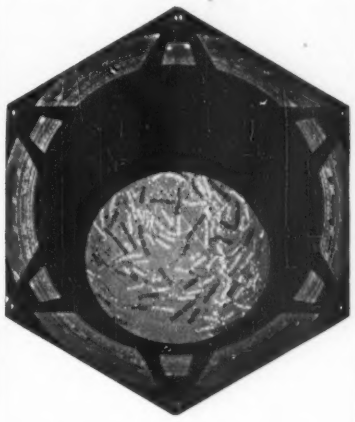

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and count slowly and carefully inward, adjusting the focus as you go, if necessary. Then repeat, counting from within outward. It is wise to enumerate the first several bees three times each, doing everything possible to avoid errors. When finished with a given bee, place it in a container marked for the number of hamuli observed. If several persons are cooperating, the containers may be in the center of the table around which all are working. Once this simple performance is mastered, each participant can count about thirty bees per hour. Very low or very high counts should be checked by the leader or teacher, who should likewise be qualified to guard against inclusion of drones among the workers — speaking of the bees, of course.

We are now ready for some of the professional jargon used in such studies. Every science has its own peculiar language and biometry is no exception. In the case under discussion, the bee is a *simple individual*, and a hamulus is a *character* possessed by that individual. *Magnitude* is a quantitative determination of the character, such as 20 hooks, and a *variate* is a single magnitude-determination of a character, as a bee with 20 wing hooks. A *class* includes all the variates with the same magnitude of the character, as all bees with 20 hamuli, while *frequency* numbers the variates of a class, as 156 bees with 20 hamuli each. There are two kinds of variates, *integral* and *graduated*; the first exhibiting *discontinuous variation* with the magnitudes expressed in definite integers, as 18 wing hooks, 19, 20, and so on. Graduated variates have a *continuous variation* of the character, as height in men. Here the biometrician must decide on some artificial and arbitrary division, such as 0.1 inch, and express the classes as 68.3, 68.4, 68.5, etc. inches.

Seriation is the process of grouping similar magnitudes into the same classes, arranged according to order of magnitude. Thus, if a number of counts of bee hamuli give the following results: 20, 21, 20, 19, 20, 20, 21, 22, 19, 22, 20, 20, 21, 23, 21, 20, 23, 20, 22, 21, 21, and 20, seriating these counts would present them as 2 of 19, 9 of 20, 6 of 21, 3 of 22, and 2 of 23. If containers to receive counted bees are placed in a row on the table, according to magnitude, the seriation is accomplished automatically. The total *number* of bees in this instance is 22, indicated by *n*. The *range* (R) shows the limits of variability of the character, by finding the class of lowest magnitude and that of the highest. In this seriation, the range is from 19 to 23. The *mode* (V_m) is the class exhibiting the highest frequency, in this case 20, with a frequency of 9.

When secured, the data are generally plotted on *coördinate paper* (graph paper), and will be seen to make a unimodal curve, or bell curve, with a single mode, more or less symmetrical. We once made a self-formed *frequency polygon* (curve) by using tall cylindrical jars as containers. When arranged according to hamulus magnitude, the bees made their own curve. If this is done, a mold-preventive must be added to each jar.

In order to apply the data, the determination of certain *constants* has become standard operating procedure in biometry. These can best be explained by giving the results of a particular former study. A large class of students counted 691 bees (*n*), with the following seriation: 2/17 (2 of class 17), 20/18, 84/19, 167/20, 190/21, 145/22, 55/23, 22/24, 4/25, 2/26. R, 17-26, V_m 21.

The *mean* (M) is now determined. Multiply each class by its frequency, add these products, then divide this sum by *n*. The result here is 20.92, a purely ideal figure, of course, since no bee has a fractional number of hamuli. The "average" bee has 20.92 hooks. If this were a morality play, we would say that Everybee has 20.92 hooks.

The *index of variability*, commonly known as the *standard deviation* (d) is found next, but is more difficult and laborious to compute. The deviation of each class from the mean is squared, multiplied by its frequency, then the sum of these products obtained. Divide this by *n* and take the square root of the dividend. For example, the deviation of the class 17 from the mean is 20.92 minus 17, or 3.92. This is squared, giving 15.3664, then multiplied by the frequency (2), resulting in 30.7328. These steps are done for each class, disregarding whether the deviation is less or greater. In our example, d came to 1.417, which represents the *amount* of variability of the wing hooks in this particular study. Any quantity greater than 1 indicates considerable variability, and by means of this constant one investigation may be compared with another of the same sort, as the hamuli of German bees versus Italian bees.

Lastly there is the coefficient of variability (CV), which is d divided by M, times 100, giving in this case 6.77. Again, this figure is useful solely for comparative purposes, but permits contrasting one subject with another, as numbers of hamuli (integral variation) with length of wing (graduated variation, measured in fractions of millimeters). The *probable error* is an amendment to each constant that expresses its degree of accuracy. Where the total number of variates chosen for study is small, the probability of obtaining erroneous constants and conclusions is high, and vice versa, so the probable error corrects for this factor. The probable error for the mean (E_M) is 0.6745 times M, divided by the square root of *n*. That for d (E_d) is 0.6745 times d, divided by the square root of $2n$, while E_{CV} is 0.6745 times CV divided by the square root of $2n$. Each of these figures is preceded by the "plus or minus" sign, indicating that the error may have to be either added or subtracted to the constant concerned.

From a number of studies of bee hamuli the following conclusions have been drawn:

If the selection of variates has been purely fortuitous (at random) from workers of a single hive, this homogeneity will be shown by the mode being single and the curve bell-shaped, sloping more or less symmetrically away from the mode on each side. Non-homogeneous material will give multimodal graphs. In worker bees, R runs from 17 to 26, the mean fluctuating around 21, the standard deviation around 1.5, and the coefficient of variability around 7. These constants indicate that the character is highly variable and that a bee does not inherit a definite number of hamuli, but only a tendency to develop some number between 17 and 26, with natural selection giving a slight and unconvincing nod to 21 as the number of greatest utility. A Russian investigator, Alpatov, found that the number of hamuli per wing increased from north to south on the great plain of Russia, but the meaning of this fact is unknown. In the United States, Alpatov concluded that there was no correlation between American hives and their geographic location, since the honeybee is a native of Europe and American hives inherit the mean of variation according to the particular European region from which they or their ancestors had been obtained.

Kellogg and Bell found less variation within a single hive than when bees from several hives were studied collectively. This is to be expected, in that hive variation is like family variation in people, and a mixed population will show greater variability than a homogeneous one. Casteel and Phillips made a comparative study of hamuli of workers and drones, and to their surprise discovered that drones exhibit the greater variability of the two. This was definitely *not* to be expected, in that drones, developed from unfertilized eggs, have only one parent, workers two, and thus workers should have the greater potentiality for variation. No explanation for this curious result has been advanced. Active and inactive workers have been compared, and German with Italian bees and each with hybrids, but the results were inconclusive or conflicting because the total number studied in each case was too small, the probable error too high. Finally, the time that has elapsed since the first of these studies, in 1904, is not yet sufficient to establish any evolutionary trends in numbers of hamuli, or perhaps the studies have not been sufficiently numerous and comprehensive. More of these researches are needed.

Dr. Corrington will appreciate any comments on the value of the material as presented in this department and any suggestions of subjects that might helpfully be covered here. Editor.

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